PediaSIM® ECS® with müse®

User Guide

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KYS Technology

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PediaSIM® ECS® Simulator Software and Users Guide©

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(In accordance with EN 45014)

We,

Medical Education Technologies Inc.
6000 Fruitville Road
Sarasota, Florida 34232 USA

declare under our sole responsibility that the product,

Type of Equipment: Human Patient Simulator Manikin
Model Number: ECS-X (AC Input)

to which this declaration relates is in conformity with the following standards or other normative documents:

EMC: EN 55011:1998 / A1:1999 Group 1 Class A
EN 61326:1997 / A1:1998
EN 61000-4-2:1995
EN 61000-4-3:2002 / A1:2002
EN 61000-4-4:1995 / A1:2001 / A2:2001
EN 61000-4-5:1995
EN 61000-4-6:1996
EN 61000-4-11:1994
EN 61000-3-2:2000
EN 61000-3-3:1995 / A1:2001

following the provision of the EMC Directive 89/336/EEC.

Sarasota, Florida 34232 USA

Signature and Date

Carlos E. Moreno

Typed Name and Title

DIRECTOR OF ENGINEERING

European Contact:

DECLARATION OF CONFORMITY

(In accordance with EN 45014)

We,

Medical Education Technologies Inc.
6000 Fruitville Road
Sarasota, Florida 34232 USA

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Type of Equipment: Human Patient Simulator Manikin
Model Number: ECS-X (DC Input)

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EN 61326:1997 / A1:1998
EN 61000-4-2:1995
EN 61000-4-3:2002 / A1:2002
EN 61000-4-4:1995 / A1:2001 / A2:2001
EN 61000-4-5:1995
EN 61000-4-6:1996

following the provision of the EMC Directive 89/336/EEC.

Sarasota, Florida 34232 USA

Signature and Date

Carlos E. Moreno
DIRECTOR OF ENGINEERING
Typed Name and Title

European Contact:

Cautions and Warnings

Please read and understand these cautions and warnings before beginning use of the PediaSIM ECS system.

Use of this equipment in an unspecified manner may impair designed protection.

Your safety is in your hands. Be sure to follow the instructions on the proper setup, breakdown and use of the PediaSIM ECS.

Shock Hazard

Electrical Safety

This product must be connected to an electrical outlet that is properly grounded. Precautions should be taken so that grounding or polarization is not defeated.

Do not place defibrillator paddles on or adjacent to the ECG patient electrodes or the PACE patient electrodes. Contact between defibrillator paddles and the ECG/PACE electrodes may cause injury to the user and damage to the equipment.

The PediaSIM ECS has been tested to work with the defibrillators employing a monophasic waveform such as the Medtronics Lifepak® 11 defibrillator. The use of other defibrillators should be certified by CAE Healthcare prior to use.

Always have the Power and Communications Unit (PCU) power switch turned off and unplugged when replacing fuses.

Always use the supplied power cords. Do not substitute.

Do not overdrive the Auxiliary Power Input circuit. Always use DC power sources rated at 12-13.5VDC.

Operate the system from a power source with the following rating:

- 115VAC, 50/60 hertz (cycles per second) (e.g. North America, Japan)

- 230VAC, 50/60 hertz (cycles per second) (e.g. Europe)

Do not spill fluids of any kind in or on any piece of PediaSIM ECS equipment.

Do not attempt to disassemble the PCU or service any of the electrical components other than the changing of fuses.

Fuse Replacement

The recommended source for replacement fuses is Littlefuse®.

Replace fuses in the Power Entry Module with a 250V/T 2A, slow blow fuse. (Recommended replacement, Littlefuse 218 002 series.)

Replace F1 with a 250V/T 10A, slow blow fuse. (Recommended replacement, Littlefuse 218 010 series.)

Replace F2 with a 250V/F 5A, fast blow fuse. (Recommended replacement, Littlefuse 217 005 series.)

Replace F3 with a 250V/T 1A, slow blow fuse. (Recommended replacement, Littlefuse 218 001 series.)

Replace F4 with a 250V/T 4A, slow blow fuse. (Recommended replacement, Littlefuse 218 004 series.)

Replace F5 with a 250V/T 5A, slow blow fuse. (Recommended replacement, Littlefuse 218 005 series.)

Gas Safety

- Be extremely careful when handling and using compressed gases. Follow the standard United States Department of Transportation or applicable national agency's warnings and regulations for handling and using compressed gases.
- Do not drop or place any gas cylinders horizontally.
- Use extreme caution when engaging the various gas valves.
- On all gas cylinders, close the valve before removing the yoke/regulator assembly.
- All air and CO_2 regulators are factory calibrated to 50 psig (345 KPa) - do not tamper with or attempt to adjust settings.
- All external air and CO_2 sources must be regulated to 50 psig (345 KPa).

ECS Gas Consumption	
E Cylinder	Estimated Hours
CO_2 (with air compressor)	40 Hours
Air (generally provided by compressor)	(Compressed and unlimited)
When running CO_2/Air combined off the E Cylinder	1 hour

General Use Warnings

Use of this equipment in an unspecified manner may impair designed protection.

Power and Communications Unit (PCU)

- Do not drop, step on or stack anything on the PCU.
- Do not operate the system in rain.
- Do not clean the PCU front panel with chemical solvents. Disconnect the PCU from the power source. Using a clean cloth, dampen with soapy water and lightly wipe. Afterwards, dry with a clean towel.

Mannequin

- Do not disassemble factory-assembled parts of the mannequin.
- Make sure the mannequin is set up on a stable, sturdy work surface to avoid collapsing and causing injury to users.
- Do not introduce foreign substances into the airway - with the exception of small amounts of approved lubricant.
- The PediaSIM ECS should be operated in ambient temperatures below 104 degrees Fahrenheit (40 degrees Celsius). Prolonged operation (> 2 hrs) in ambient temperatures greater than 104 degrees Fahrenheit (40 degrees Celsius) will result in anomalous behavior and out-of-spec performance.
- Only perform invasive procedures supported by the system as described in applicable sections of the User Guide.
- Do not pick the mannequin up by the limbs — support head and leverage weight with torso.
- Apply water to the mannequin only in accordance with the supported clinical procedures identified in this User Guide.
- Latex is contained within the mannequin in the fluid system tubing. Individuals with latex allergies should take necessary precautions.

Latex Warning

CAE Healthcare simulators incorporate latex into their design. When performing certain maintenance procedures, the latex can become exposed. Users with latex sensitivity should take necessary precautions when handling the simulator while performing those procedures.

Specifications

Size: PCU – 590 mm x 370 mm x 260 mm

Mannequin – 48 inches (122 cm)

Weight: PCU – 16 lbs (7.27 kg); Mannequin – 38 lbs (17.24 kg)

Environmental Specifications:

Operating 41°F to 104°F (5°C to 40°C)

Storage 41°F to 122°F (5°C to 50°C)

The following is for Compliance with CSA 22.2 No. 1010-1, UL 61010A-1 and EN61010-1:

Pollution Degree: 2

Installation Category II

Altitude up to 6,561 ft (2,000 M)

Humidity 92.5% up to 104°F (40°C)

Mains supply voltage fluctuations not to exceed ± 10% of nominal supply voltage.

Pneumatic Specifications:

Air 50 - 95 PSI, with peak flow rates up to 1.5 liters per minute

CO_2 Maximum flow rate = 200 mL/min

Power:

PCU and Mannequin

AC Input	AC 100 – 240VAC, 50/60Hz
Consumption	Approx. 94W
DC Input	DC 12.0 – 13.5VDC
Consumption	Approx. 72W

Instructor Workstation

AC Input	AC 100 – 240VAC, 50/60Hz
DC Input	N/A – Internal Battery
Consuml tion	Approx. 50W

Remote Control

AC Input	AC 100 – 240VAC, 50/60Hz
DC Input	N/A – Internal Battery
Consumption	Approx. 50W

Wireless Microphone

Transmits over user-selectable frequencies between 790 and 806 MHz at 10 mW.

This frequency range is legally appropriate for the entire United States and for most international sites; however, you may wish to contact local authorities regarding regional requirements.

TouchPro Computer
Please see your product's user guide for power specifications

System Requirements

If you are not using a TouchPro computer or Wireless Remote provided by CAE Healthcare, please be sure to utilize a computer with wireless capability. When operating the TouchPro or Müse software, a computer with a Macintosh® or Microsoft Windows® operating system may be used.

To run the TouchPro or Müse software, the computer used must meet the following minimum requirements:

Macintosh® Operating System

- Mac OS X 10.5.8 (minimum)
- Safari® 5.x.x or Firefox® 10 ESR (minimum)
- Adobe Flash Player® 10.1.x.x (minimum)
- Adobe Reader 9.x (or higher)

Windows® Operating System

- XP Service Pack 2, Vista, Windows 7 or Windows 8
- Firefox® 10 ESR, Internet Explorer® 8 or Safari 5.x.x (minimum)
- Adobe Flash Player® 10.1.x.x (minimum)
- Adobe Reader 9.x (or higher)

Hardware (Windows and Macintosh)

- Intel Core Duo, 2.0 GHz (minimum)
- 2 GB DDR3 RAM (minimum)
- 8 GB Hard Drive space available
- 1024x768 screen resolution (minimum)
- USB 2.0
- Wireless 802.11b/g/n Ethernet card
- 100BASE-T Ethernet Adapter

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Appendix A - Müse Parameter Descriptions A-1

Introduction

As the worldwide leader in patient simulation technology and education, CAE Healthcare is excited to introduce the PediaSIM® Emergency Care Simulator (ECS®). Using the powerful Müse software, the PediaSIM ECS incorporates highly developed pediatric patient physiological models that generate realistic and automatic responses to clinical interventions and drug administrations specific to pediatric patients.

PediaSIM ECS

What makes the PediaSIM ECS so unique is its versatility and usability. Combining intricate systems design with flexible, user-oriented software achieves a high-tech, interactive synergy that creates realistic learning experiences. The ultra-sophisticated system captures the complexities of human physiology with heart and breath sounds, palpable pulses and a myriad of other features that create a true and accurate representation of the human body. The intuitive design of the PediaSIM ECS and the realistic physiological models make it easy for instructors as well as learners to use the system.

The educational value of the PediaSIM ECS is made apparent with its use in critical care interventions such as CPR, airway management, drug administration and defibrillation, which can be applied to the simulator, better preparing healthcare professionals for critical events involving children. With the flexibility of using preprogrammed or user-initiated scenarios, instructors can create real-life drama to help hone and perfect the skills of their learners.

Equipment Overview

The PediaSIM ECS has been designed to be used in any learning environment. The PediaSIM ECS's standard features are easily integrated into a laboratory setting where the PediaSIM ECS can be operated using controlled central air/gas supply sources and regular AC power. However, because the portability of the PediaSIM ECS allows for its use in offsite locations, an optional Air Compressor and an optional Auxiliary Power Supply are available for those areas that do not have a central air/gas supply or an electrical power source.

As you would with any shipment, cross-check this inventory with your CAE Healthcare packing invoice to verify that all components have been received.

Components Inventory

The PediaSIM ECS comes with all the necessary equipment for establishing an educational simulation center.

	Standard Equipment
	Pediatric Mannequin
	Umbilical Assembly
	PCU with Wireless Receiver
	Laptop Instructor Workstation
	Inventory Kit
	Wireless Microphone

*Detailed descriptions of this equipment can be found in the section **PediaSIM ECS Standard Equipment**, beginning on page 4.*

Optional equipment is available to accommodate special customer requirements. For example, options like auxiliary power, air compressors, and a wireless remote enable instructors to create real-life scenarios at authentic locations.

	Optional Equipment
	Mannequin Soft-Sided Carrying Case
	Tablet Instructor Workstation
	Wireless Remote Control (Laptop)
	Shoulder Bag and Sleeves
	Computer Stand
	Auxiliary Power Supply
	Air Compressor
	Gas Accessory Kit
	ECS Portability Kit
	Trauma/Disaster Casualty Kit (TDCK)

*Detailed descriptions of this equipment can be found in the section **Optional Equipment for the PediaSIM ECS**, beginning on page 15.*

Contact CAE Healthcare Customer Support at 1-866-462-7920 if there are any questions or if optional equipment is needed.

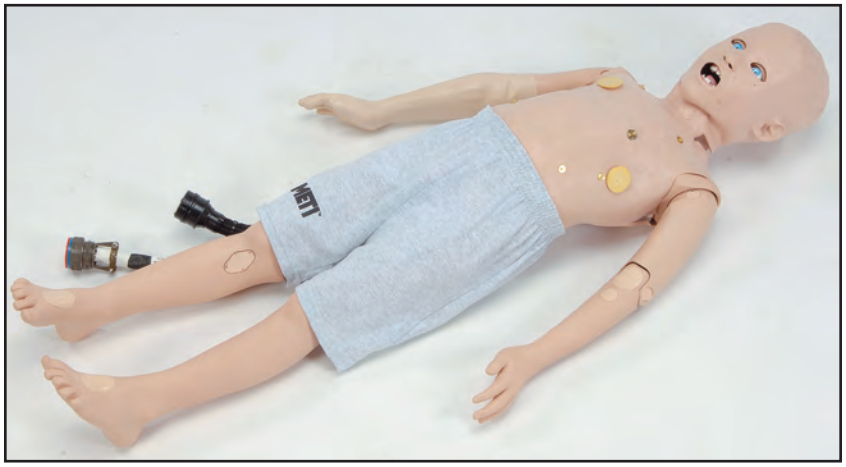
PediaSIM ECS Standard Equipment

The design of the PediaSIM ECS system allows students to focus on the patient mannequin while giving instructors the ability to create an endless number of possible clinical situations.

Full-Body Pediatric Mannequin

All patient assessments and clinical interventions are played out on the PediaSIM ECS mannequin, which represents a pediatric patient. At 4'0" (122 cm) in height and weighing 38 pounds (17.2 kg), the mannequin is fully operational in the supine, lateral, prone and seated positions and can be placed on any flat surface such as a gurney, an emergency room operating table, the ground or even in a vehicle. The mannequin offers features like right arm pronation and supination, breath, heart and bowel sounds, palpable pulses, patient voice, genitourinary features and airway management features.

A bundled system of hoses known as the fluidic/pneumatic pigtail and an electrical cable called the electrical pigtail are attached to the mannequin in the perineum area.



Both pigtails attach to the Umbilical Assembly.

Umbilical Assembly

The Umbilical Assembly holds a bundle of color-coded hoses and an electrical cable. The electrical cable, which provides power and transmits information from the Instructor Workstation, has a specialized fitting that connects to the PCU's 12-volt DC power source. The bundle of colored hoses connects to the receptacle beneath the electrical cable on the CPU. These hoses provide for a variety a functions:

Hose Color	Connection Function
Yellow	Main Air
Clear	Main CO_2
Red	IV Source
Blue	IV Drain
White	Trauma Source
Orange	GU Source

Power and Communications Unit (PCU) with Wireless Receiver

The PCU is the hub of communication and power for the ECS system. This unit is about 24" tall x 15" wide x 10" deep (610 mm tall x 380 mm wide x 254 mm deep) and weighs about 10 pounds (5 kg). Conveniently contained in a rolling, hard-sided case, the PCU is the most central of all the ECS system components. Inside the PCU are a DC power supply and the Wireless Ethernet Switch.

When in operation, the PCU should be placed horizontally so that the cover opens upward as shown in the picture below.

Opening the PCU

Located beneath the cover on the PCU Interface Panel are the Wireless Receiver, the power switch and a number of labeled ports, which are described in detail in the pages that follow.

PCU Power Ports, Fuses and Switch

Located in the upper left of the PCU are the electrical controls and the source of the power for the PCU and the monitor.

1 In a standard laboratory configuration (using AC Power), the power cord is plugged into the **AC IN** port. This should be done prior to plugging the cord into the power source, which should be a surge-protected outlet to protect the integrity of the electrical system and reduce the chance of blowing fuses.

NOTE: Beside the **AC IN** port is small fuse panel labeled **Fuse: 250V/T2A**. Before replacing a burnt fuse, refer to the *Cautions/Warnings* section of this User Guide.

2 The **POWER SWITCH** is used to turn the PCU **ON** and **OFF**, whether running on standard AC current or utilizing a 12-volt DC power supply.

3 A green indicator light labeled **POWER ON** illuminates when the PCU is running.

4 If users have a Waveform Display Monitor (optional), it can be operated on 12-volt DC power using the **MONITOR POWER** port and the supplied adapter cord.

5 The **AUX POWER IN 12VDC-4A** port allows the ECS system to be run from a 12-volt DC power source such as the optional Auxiliary Power Supply.

6 The five fuses housed in the ports labeled **F1** through **F5** are identified by their voltage and amperage. To change a fuse, open the port cap with a flathead screwdriver so that the burnt fuse pops out. Be sure to choose the correct fuse from the Spare Fuse Kit when selecting a replacement. The new fuse is secured by replacing and tightening the cap.

> Before replacing any burnt fuse, refer to the **Cautions/Warnings** section of this User Guide.

Umbilical Ports

The two large circular fittings labeled **UMBILICAL** are used to connect the mannequin via the pigtails and the umbilical to the PCU.

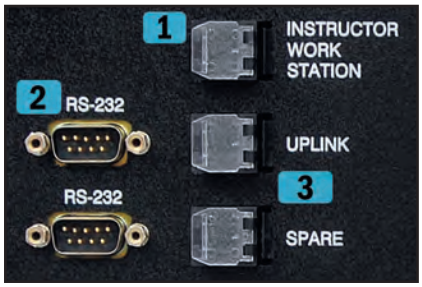
Umbilical Ports

1 The upper circular port is the receptacle for the umbilical's electrical cable and has a notched fitting where the cable connects and locks into place. This connection establishes the communication of electrical input/output and computer signals to the mannequin.

2 The lower circular port is the receptacle for the fluidic/pneumatic portion of the umbilical and has a white plastic fitting into which the five hoses wrapped in the umbilical are secured. The fluidic/pneumatic assembly allows gases (CO_2 and air) to flow to the PCU and back to the mannequin.

Instructor Workstation Uplink and Expansion Ports

There are three Ethernet and two RS-232 ports on the PCU.



Instructor Workstation Uplink and Expansion Ports

1 The **INSTRUCTOR WORKSTATION** port connects the Instructor Workstation (the laptop) to the PCU through an Ethernet cable. A Wireless Ethernet Switch inside the PCU directs signals from the Instructor Workstation to the patient mannequin. The switch is maintenance-free and requires no usage or care instructions.

2 The two **RS-232** ports are used to connect accessories such as the Trauma/Disaster Casualty Kit (TDCK).

3 Currently, the **UPLINK** and **SPARE** Ethernet ports can be used with METIVision.

Gas Supply Connections

At the bottom-left of the PCU Interface Panel are two ports labeled **MAIN SUPPLY GAS AIR-OR-CO_2** and **EXPIRED CO_2 SUPPLY**, along with their pressure specifications: **50 psig/345 kPa**.

Gas Supply Connections

1 The **MAIN SUPPLY GAS AIR-OR-CO_2** port is used to connect compressed air or gas via a hose to the PCU. With this connection, various "life signs" can be displayed on the mannequin, such as breathing and pulses.

2 For the mannequin to exhale CO_2, a CO_2 source must be connected to the **EXPIRED CO_2 SUPPLY** port.

An optional Gas Accessory Kit is available for connecting centrally supplied compressed air and CO_2 to the PCU.

Audio Jack

The small jack labeled **AUDIO OUT** allows the connection of the simulator's audio outputs directly into an available audio/visual system to amplify the patient's sounds for a larger audience.

Audio Jack

Currently, all sounds are reproduced from one channel.

Wireless Channel Set

The Wireless Receiver on the PCU works in tandem with the Wireless Microphone to provide the instructor with a means of verbal communication through the mannequin.

Wireless Channel Set

The dual antennas of the Wireless Receiver turn upward to increase range, and the receiver has a volume control feature to produce high quality sound. The receiver is powered from a power supply inside the PCU.

The receiver and microphone are configured to the same channel. However, if it becomes necessary to change the channel selections on the transmitter and receiver, use a small screwdriver to adjust the Group and Channel settings on the receiver and transmitter to a new, matching frequency.

When using multiple simulators, adjust the wireless microphones and receivers of each system to separate matching channels to avoid crosstalk.

Before closing the PCU case after using the wireless channel set, be sure to return the dual antennas to their original position (folded downward toward the PCU).

Laptop Instructor Workstation

The Laptop Instructor Workstation is a laptop computer that utilizes the Müse software to operate as the main simulation control center.

Instructor Workstation

IMPORTANT: All computer components are preconfigured for use with PediaSIM ECS. Only approved CAE Healthcare applications should be installed or run on the PediaSIM ECS computer system.

Inventory Kit

An Inventory Kit is included with the PediaSIM ECS. Details on how to use the replacement items can be found in the **Using the System** section of this User Guide.

IV Arm Kit

The IV Arm Kit provides replacement components for use with the intravenous system.

IV Vein Tubing

140-mL Syringe

Fuse Replacement Kit

A package of replacement fuses for the PCU is shipped with the PediaSIM ECS. See the **Cautions and Warnings** section of this User Guide regarding the safe replacement of fuses.

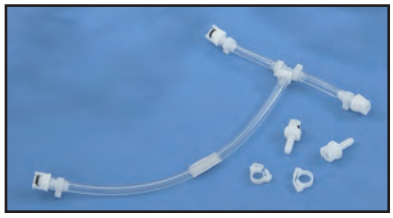
Airway Kit

The Airway Kit includes silicone spray, an additional neck patch (not shown in photo below) and two rolls of airway tape (not shown).

Silicone Spray

Blood Pressure Cuff Splice Kit

A T-fitting and adapters are supplied to configure a standard BP cuff to work with the PediaSIM ECS. *(Also see Manual Blood Pressure on page 185.)*



Blood Pressure Cuff Splice Kit

Genitourinary (GU) Kit

The GU Kit includes interchangeable female genitalia (The mannequin is shipped with the male genitalia attached).

Female Genitalia

Optional Equipment for the PediaSIM

Additional components enable the PediaSIM ECS system to be customized to fit the specific needs of a wide variety of education environments.

Mannequin Soft-Sided Carrying Case

Designed to keep the mannequin secure during transport and storage, the soft-sided carrying case comes with heavy-duty zippers and three internal security straps.

Two cushioned headrests attached to the support board cradle the mannequin's head, while the mannequin lays flat inside the case, strapped in to reduce movement. Zippered pockets on the front panel offer storage for teaching tools as well as enough room to store an **Optional** computer stand.

Tablet Instructor Workstation

The Tablet Instructor Workstation is an optional, ruggedized tablet computer that can be used instead of the Laptop Instructor Workstation to run the Müse software. An additional Müse license is provided with this option.

NOTE: The Tablet Instructor Workstation cannot perform calibration utilities. The Laptop Instructor Workstation is needed to perform these functions. Additionally, the Tablet Instructor Workstation and the Laptop Instructor Workstation cannot be used at the same time. Müse content is not shared between the Tablet and Laptop Instructor Workstations.

IMPORTANT: All computer components are preconfigured for use with PediaSIM ECS. Only approved CAE Healthcare applications should be installed or run on the PediaSIM ECS computer system.

Wireless Remote Control (Laptop)

CAE Healthcare offers an optional Wireless Remote Control laptop, preconfigured with the same software as the Instructor Workstation, to be used when the use of an Ethernet cable is restrictive.

Wireless Remote Control

Shoulder Bag and Sleeves

The optional shoulder bag with padded sleeves can be used to carry computer components to another location or to store the system when it is not in use.

Shoulder Bag and Sleeves

The shoulder bag is soft-sided and large enough to hold all of the available computer components as well as the power supply and various cables.

Computer Stand

CAE Healthcare offers an optional computer stand that is designed to support the Instructor Workstation or the optional Wireless Remote Control.

Each stand is made of sturdy metal and weighs less than 2 pounds (less than 1 kg). Up to three stands can be stored inside the Mannequin Carrying Case.

Computer Stand with Laptop

Auxiliary Power Supply

CAE Healthcare offers two different Auxiliary Power Supply options for running the PediaSIM ECS system in a remote location. Both components include a 12-volt DC power source and a 25' (7.5 meter) cable with the appropriate fittings to connect to the PCU Interface Panel in the port labeled **AUX IN 12VDC**.

Auxiliary Power Supply Kit #APS-001

Auxiliary Power Supply Kit #APS-002

Both Auxiliary Power Supply kits run the system for approximately three hours. Both options are rechargeable using a local AC power source.

Any auxiliary power supply used with the PediaSIM ECS must agree with the following specifications:

AC Input:	AC 100-240VAC, 50/60 Hz
Consumption:	Approx. 94W
DC Input:	DC 12.0 — 13.5VDC
Consumption:	Approx. 72W

Air Compressor

For educational environments with power but no central air/gas supply, two air compressors are available as options. An air compressor designed for quiet operation is available for in-room use, and an alternative air compressor is available for situations where the compressor resides in a location, such as a storage room, set apart from the simulator.

Out-of-Room Air Compressor #AIR-002

Quiet In-Room Air Compressor #AIR-003

Both Air Compressors are AC powered and include a regulator and an air hose with the appropriate connector fitting.

Gas Accessory Kit

The Gas Accessory Kit includes two complete assemblies for connecting H-cylinders for air and CO_2 to the PCU.

Gas Accessory Kit

Both assemblies have color-coded hoses (yellow for air and gray for CO_2) that are attached to independent, adjustable pressure regulators. These regulators are used to ensure the pressure supplied to the system is 50 psig/345 kPa. The appropriate PCU fittings are attached to the other end of the hoses for easy configuration.

ECS Portability Kit

The ECS Portability Kit includes a power kit (with battery) and a CO_2 regulator set for 50 psig/ 345 kPa that attaches readily to a small (E-cylinder) CO_2 canister.

A wrench is supplied with the regulator to open the CO_2 valve on the canister. A blue nylon bag is also included for the E-cylinder.

The CO_2 regulator attaches readily to a small CO_2 canister.

Attaching the CO_2 Regulator

CO_2 Regulator Connected

A 22-Amp Portability Kit is also available.

Please refer to the **Cautions/Warnings** section of this User Guide for safety instructions.

Follow local warnings for the handling and use of compressed gas.

Use extreme caution when fastening the regulator into place.

Keep the CO_2 canister in an upright position when attached to the regulator. Failure to do so could cause damage to the CO_2 regulator.

Trauma/Disaster Casualty Kit (TDCK)

The TDCK adds to the fidelity of a training session by providing the means to add the flow of blood, mucous and secreted fluids from the mannequin while using the moulage kit to give a realistic look to the injury or condition.

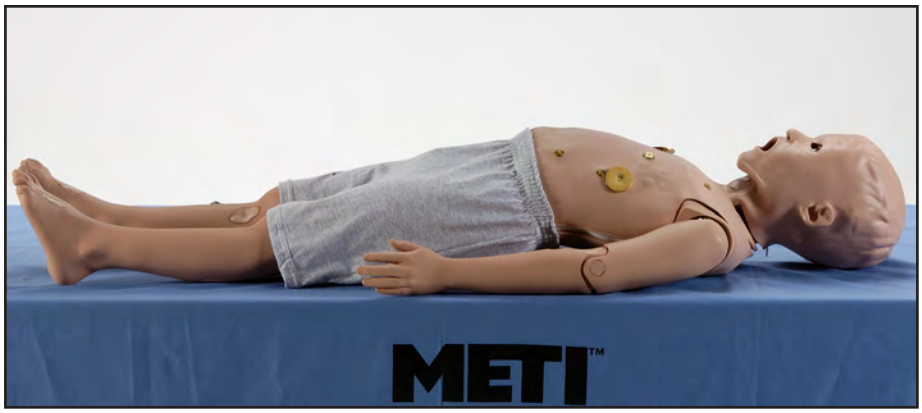
The Trauma Disaster Casualty Kit

PediaSIM ECS Clinical Features

The PediaSIM Emergency Care Simulator (ECS) represents the latest in the state-of-the-art simulation technology for training clinicians at all levels of healthcare education. Sophisticated mathematical models of human physiology and pharmacology automatically determine the patient's response to user actions and interventions. With dynamic coupling of the cardiovascular, respiratory and pharmacological models along with the physical embodiment of the mannequin, the PediaSIM ECS allows for the complete characterization of a pediatric patient. The following specification highlights the clinical features of the PediaSIM ECS.

Mannequin

The mannequin comes with interchangeable genitalia for the representation of male and female patients. The mannequin can be placed on standard operating room tables, an ICU bed, on the ground or even in a vehicle (in the case of a simulated accident) and is fully operational in the supine, lateral, prone and seated positions. Additionally, along with jointed movement in the left arm, legs and hip joints, the mannequin's right arm supinates and pronates for clinically appropriate positioning to start an IV.



The PediaSIM ECS Mannequin

The mannequin allows for the physical assessment of various clinical signs (e.g., heart/breath/bowel sounds, palpable pulses, chest excursion, airway patency) that are dynamically coupled with mathematical models of human physiology and pharmacology.

Physiological and Pharmacological Features

The PediaSIM ECS simulates patient reactions based on complex cardiovascular, respiratory and pharmacological models.

Neurologic System

The PediaSIM ECS is equipped with a number of features specifically targeted to support training for neurological care. The following provides a general overview of each feature.

- *Eye Signs:* Each eye has functional eyelids that blink and pupils that can be adjusted independently to three levels of dilation (pinpoint, normal and blown). Eyelids automatically close under any of the following conditions:

  Spontaneous Minute Ventilation < 1500 mL

  Neuromuscular Blockade > 30%

  SpO_2 < 75%

- *Secretions:* Body fluids can be secreted from the eyes, ears and mouth.

Respiratory System

The PediaSIM ECS represents a realistic Respiratory System, using both physical and mathematical models to achieve an extremely accurate simulation of respiration. This system is tightly integrated with the Cardiovascular System, as well as other models within the PediaSIM ECS system.

Respiratory System Features
The simulated patient breathes spontaneously with a self-regulated rate and tidal volume sufficient to maintain a target arterial carbon dioxide partial pressure, typically 40 mmHg, which can be adjusted by the instructor. The respiratory system is capable of simulating events such as atelectasis, pneumothorax and asthma.
The patient's lungs simulate consumption of oxygen and the production of carbon dioxide in accordance with the principles of uptake and distribution. Alveolar and arterial gas concentrations are dynamically coupled with spontaneous or mechanical ventilation.
The lungs are realistically modeled with respect to the range of tidal volumes and functional residual capacity.
Lung and chest wall compliance are modeled with independent control of the left and right lung.
Ventilation results in the appropriate concentrations of alveolar and arterial carbon dioxide. Presence or absence of exhaled carbon dioxide can be monitored using a colormetric indicator, such as an Easycap® CO_2 detector.
Symmetric and asymmetric lung ventilation are automatically supported in response to bilateral and unilateral compliance and resistance changes, proper or incorrect intubation and pathophysiological states such as tension pneumothorax. This capability can be accomplished automatically without instructor intervention.
The mannequin's upper chest rises and falls synchronously with the inflationary state of the underlying lungs. This movement is synchronized with inspiration and expiration of spontaneous, manual and automatic ventilation of the lungs and combinations thereof. The depth of chest excursion is proportional to tidal volume and responds appropriately to pathophysiologic states such as tension pneumothorax.
The mannequin's upper chest rises and falls synchronously with the inflationary state of the lungs. This movement is synchronized with inspiration and expiration of spontaneous, manual and automatic ventilation of the lungs and combinations thereof. The depth of chest excursion correlates to the physiologic tidal volume displayed on the user interface.

Normal and Difficult Airway

The mannequin provides an anatomically realistic upper airway (oropharynx, nasopharynx and larynx), representing that of a pediatric patient.

Airway Module Features
Direct laryngoscopy as well as oral and nasal tracheal intubation can be performed.
Right or left mainstem endobronchial intubation automatically results in unilateral breath sounds and chest excursion.
Esophageal intubation is fully supported, in which case breath sounds, chest excursion and carbon dioxide output are absent and gastric distension occurs.
Swelling of the posterior oropharynx (airway occluder) can be activated by the instructor to obstruct the view of the larynx and prevent intubation but allow mask ventilation of the patient's lungs, thereby creating a "cannot intubate, can ventilate" scenario.
Tongue swelling can be activated to varying degrees (moderate or severe), thereby hindering laryngoscopy and endotracheal intubation.
A laryngospasm actuator closes the patient's vocal cords and prevents both ventilation and intubation. When activated along with the airway occluder, a "cannot ventilate, cannot intubate" crisis scenario is achieved.
A "tape sealed" window (simulating the cricothyroid membrane) enables training in various emergency procedures, including: Needle cricothyrotomy Transtracheal jet ventilation Retrograde wire techniques Cricothyrotomy

In addition, the patient's airway supports:

Endotracheal tube intubation

Bag-valve-mask (BVM) ventilation

Laryngoscopic procedures

Airway Management and Ventilation: Alveolar and arterial gas concentrations appropriately reflect the efficacy of the employed ventilatory technique, such as mouth-to-mouth, bag valve mask, endotracheal intubation and transtracheal catheter ventilation. Administration of supplemental oxygen is entered by the instructor with automatic and appropriate patient clinical responses.

Pulmonary System Features
In the case of endobronchial intubation, breath sounds and chest excursion are automatically absent over the lung that is not ventilated. Also, in the case of esophageal intubation, breath sounds, chest excursion and carbon dioxide output are automatically absent, but the stomach distends with positive pressure ventilation attempts.
Pulse oximetry is fully supported. The reported oxyhemoglobin saturation correlates correctly and dynamically with the alveolar oxygen concentration and the patient's intrapulmonary shunt fraction. The saturation value can be displayed on the Instructor Workstation, the Patient Status Display, TouchPro software or on the optional Wireless Remote Control.
The pulmonary response to intravenously injected drugs or inhaled anesthetics is appropriate and dose-dependent.
The physiological mathematical models continuously calculate the patient's arterial blood gases, venous blood gases and pH. This data can be displayed on the Instructor Workstation, Patient Status Display, TouchPro software or optional Wireless Remote Control.

Needle Decompression of Tension Pneumothorax: Decompression of a tension pneumothorax can be performed by inserting a needle at the mid-clavicular line of the second intercostal space on the left or right side of the mannequin. Proper needle placement results in rapid decompression, a rush of air exiting the proximal end of the needle and improvement in pulmonary mechanics and gas exchange.

Chest Tube Placement and Management: A chest tube can be inserted into the mid-axillary line of the fifth intercostal space on the left or right side of the mannequin. Using ordinary chest tube suction equipment, fluid and air can be withdrawn from the pleural space. The volume removed influences the patient's physiology to reflect improvement in pulmonary mechanics and gas exchange.

Cardiovascular System

Like the PediaSIM ECS's Respiratory System, with which it is tightly integrated, the Cardiovascular System accurately simulates a wide variety of hemodynamic conditions and responses.

Cardiovascular System Features
The simulated patient generates heart sounds, including a range of pathological sounds that are synchronized to the QRS complex of the ECG and are audible with a standard stethoscope over the left and right upper sternal border, left lower sternal border and apex.
A 5-lead ECG is emitted from the appropriate positions on the patient's chest for display on a standard monitor. The simulator generates a normal sinus ECG, as well as a broad range of abnormalities such as myocardial ischemia, sinus tachycardia and bradycardia, ventricular fibrillation and asystole.
The hemodynamic response to arrhythmias is physiologically correct.
Myocardial oxygen balance and cardiac ischemia automatically influence the cardiac rhythm, resulting in a realistic and automatic response of the rhythm to hypoxemia. The degree of influence can be controlled or completely overridden by the instructor.
Palpable carotid, radial, brachial, femoral and pedal pulses are provided and are synchronous to the ECG. A pulse deficit automatically occurs if the systolic arterial blood pressure falls below the following thresholds: Carotid: 60 mmHg Radial: 90 mmHg Brachial: 70 mmHg Femoral: 80 mmHg Pedal: 80 mmHg
The pulse threshold set points can be adjusted by the instructor to meet specific clinical and educational requirements. The left and right radial, brachial, femoral and pedal pulses are independently controllable by the instructor for presence and absence in the case of trauma to a specific extremity or other conditions.
A standard blood pressure cuff and sphygmomanometer can be used to assess systolic blood pressure by palpation or by auscultating Korotkoff sounds.

The invasive hemodynamic monitoring feature provides the capability to measure and monitor the following:

Arterial blood pressure

Left ventricular pressure

Central venous pressure

Right atrial pressure

Right ventricular pressure

Pulmonary artery pressure

Pulmonary artery occlusion (wedge) pressure

Thermodilution cardiac output

In addition, the following responses and interventions are available with the invasive hemodyamic monitoring feature:

The introduction and progressive insertion of a pulmonary artery catheter, synchronous with the appropriate waveforms, can be simulated, with the results shown on the Patient Status Display or the TouchPro software.

The patient has a baroreceptor reflex, the sensitivity of which can be controlled by the instructor.

The cardiovascular system simulates hypovolemia, hypervolemia and right and/or left heart failure.

The patient's cardiovascular response to intravenously administered drugs is automatic and dose-dependent.

Cardiovascular responses to sympathetic and parasympathetic activities are modeled.

■ *Chest Compression:* In accordance with Pediatric Advanced Life Support (PALS) guidelines, effective chest compression of the patient's sternum results in artificial circulation, cardiac output, central and peripheral blood pressures, palpable pulses and CO_2 return. Pressure fluctuations are seen on invasive catheter waveforms, with amplitude dependent upon the effectiveness of chest compressions. The presence or absence of exhaled CO_2 is directly related to chest compression effectiveness and automatically and significantly increases when cardiac resuscitation is successful.

■ *Cardiac Arrhythmias:* The instructor is able to select and maintain a desired arrhythmia and control the simulated patient's response to clinical interventions.

■ *Electrical Therapy:* Both conventional defibrillators and automatic external defibrillators (AEDs) can be applied to the simulator. With both devices, the delivered energy is quantified in real-time to trigger the appropriate patient response. The ECG can be monitored via the defibrillator contacts (paddles or pads), enabling AEDs to respond appropriately to changing cardiac rhythms. Also, transcutaneous pacemakers can be applied. The instructor is able to adjust the levels at which electrical capture and mechanical capture occur.

Metabolic System

Arterial blood gases (ABGs), including pH, PCO_2 and PO_2, and venous blood gases are physiologically modeled within the system so the results are made available on the Instructor Workstation and the optional Wireless Remote Control. The ABG data displayed corresponds accurately and dynamically to the alveolar concentration of CO_2 and O_2. Metabolic acidosis and alkalosis are simulated under instructor adjustment of the ABG pH level, thus facilitating simulation of patients with diabetic ketoacidosis.

Genitourinary System

The mannequin, which is provided with interchangeable male and female genitalia, allows for the insertion of urinary catheters. The genitourinary system provides for excretion of urine with a flow rate that is controlled by the instructor.

Pharmacology System

The PediaSIM ECS Pharmacology System facilitates the administration of IV drugs.

- *Pharmacological Therapy:* All drugs required by the PALS algorithms are supported.

Pharmacology System Features
The pharmacology module contains preprogrammed pharmacokinetic and pharmacodynamic parameters for over 60 intravenous medications.
The right arm of the patient mannequin allows for intravenous access in a multitude of locations, including the cephalic, basilic and antibrachial veins. Additionally, a permanent access catheter is located at the right internal jugular.
Bolus injections are administered utilizing standard syringes, while continuous intravenous infusions can be administered utilizing a wide variety of standard infusion pumps. Both injection methods are entered from either the Instructor Workstation or the optional Remote Control. Once the dosage is entered, the patient response is automatic and dependent on patient weight, physiological status, ongoing therapeutic interventions and injury/disease status.
The patient appropriately and automatically responds to incorrect medications with no user intervention necessary. Likewise, over- and under-dose responses are appropriate.
The Event Log feature of the software allows the instructor to quickly review all boluses and current drug infusions given by the learner.

PediaSIM ECS Simulated Clinical Experiences

The PediaSIM ECS is a model-driven, script-controlled system designed to simulate a patient's physiological condition, clinical signs, symptoms and responses to certain clinical interventions. Simulated Clinical Experiences, or SCEs™, are process tools that enable the faculty/educator to execute a learning strategy using simulation. Each process tool provides an extensive overview and outline of the learning exercise and requires minimal additional faculty development time for use. Each SCE is comprised of a patient and can include up to four scenarios.

The PediaSIM ECS system includes six SCEs that cover a range of events and crises:

- Accidental Overdose
- Closed Head Injury
- Diabetic Ketoacidosis with Hypoxemia
- Accidental Electrocution
- Obstructed Airway
- Trauma with Pneumothorax

Each SCE includes the information below and can be printed from the Müse software:

- Background Information and Patient History
- Synopsis
- Learning Objectives
- Learning Performance Measures
- Equipment and Supplies suggested for the simulation
- Facilitator Notes
- Debriefing Points
- Teaching Q&A
- References

Patient Files

In the software, each patient is represented by a patient file that defines the initial condition of the simulated patient's physiology and sets the values of the parameters and variables upon which that patient's physiological and pharmacological models are based. For example, a patient file initially sets the respiratory rate of the simulated patient's lungs, as well as other specific values. Once a patient file is loaded, the models automatically regulate the simulated patient's physiology in accordance with the type of patient defined.

The PediaSIM ECS is supplied with two preconfigured pediatric patients:

- Andy Stevenson (A healthy, 6-year-old male)
- Emily Liu (A healthy, 6-year-old female)

The preconfigured patients cannot be overwritten, but new patients can be created and saved, and existing patients can be modified, depending on the needs of the instructor.

Scenarios

Each scenario is a set of simulator commands that instruct or cause the simulator to react or respond in a specific manner. Scenarios are used to determine the initial and subsequent physiological states as well as the different conditions that arise during the simulation exercise. Each scenario also includes logged documentation to support its use.

By utilizing the Scenario Designer feature of the Müse software, users can modify the preconfigured scenarios or create custom scenarios to meet specific educational objectives.

Instructors may also modify events within a given scenario in real-time to increase or decrease event severity and shorten or prolong the duration of an event at any time during a simulation exercise. Any Base Patient can be combined with any scenario, creating a wide variety of clinical care simulations.

For instructions on modifying scenarios and creating new scenarios, refer to the **Using the Software** section of this User Guide.

Patient Monitoring

The TouchPro software allows for physiological waveforms and numeric data to be displayed in real-time without requiring a full-function patient monitor. Users can select from a number of parameters to configure the TouchPro software to address specific learning objectives.

The following patient monitoring parameters are supported:

- 5-Lead ECG
- Arterial Blood Pressure
- Left Ventricular Pressure
- Right Atrial Pressure
- Right Ventricular Pressure
- Pulmonary Artery Pressure
- Pulmonary Capillary Wedge Pressure
- Central Venous Pressure
- Pulse Oximetry Plethysmogram
- SpO_2
- Pulse/Heart Rate
- Blood Temperature
- Body Temperature
- Rectal Temperature
- Axial Temperature
- Noninvasive Blood Pressure
- Continuous Cardiac Output
- Thermodilution Cardiac Output
- Intracranical Pressure

Alarm limits with accompanying sounds can be configured for each parameter. When the pulse/heart rate is monitored, an accompanying sound is played in synchrony with the cardiac cycle. When pulse oximetry is monitored, the sound pitch dynamically correlates with the percent saturation. A 5-lead ECG is emitted from the appropriate positions on the chest of the patient mannequin for display on a standard monitor. The simulator generates a normal sinus ECG, as well as a broad range of abnormalities, including sinus tachycardia, bradycardia, ventricular fibrillation and asystole.

System Controls

The PediaSIM ECS has been designed to allow the instructor to focus attention on learner actions and reactions by providing a flexible set of tools that adjust readily to the instructor's needs.

Main Application Software

The Müse Software is the main application software that provides the instructor a means to control all features of the simulator. Instructors can select SCEs as well as control the flow of the scenarios via the user interface. Various drug, cardiovascular, respiratory, fluid and other parameters can be individually applied "on the fly" to enhance the course of a simulation exercise. A Patient Status Display and set of simulation log windows provide a real-time display of vital signs, blood gases, drugs administered and other events. This data can be exported into permanent storage or printed for future reference.

System Tools

Instructor Workstation: An Instructor Workstation enables the instructor to control all aspects of the simulator. Instructors can select a given patient profile or scenarios and control the flow of a simulation exercise while monitoring patient parameters, drugs administered and other interventions. Additionally, all patient parameters can be adjusted "on the fly" to enhance the teaching points of the simulation in progress. The windowed, point-and-click design of the software provides an intuitive, easy-to-learn, and easy-to-use operator/instructor interface.

Wireless Remote Control (Optional): A full-function wireless Remote Control device (laptop) enables the instructor to control all aspects of the simulator from the bedside. Because the user interfaces on both the Instructor Workstation and Wireless Remote Control are identical, instructors only have to familiarize themselves with a single control interface.

Getting Started

The PediaSIM ECS system is comprised of three basic components:

The Mannequin

The PCU

The Instructor Workstation

Basic setup requires connecting these three components as well as the air/gas and electrical supplies. Setting up the PediaSIM ECS system the first time should take approximately 30 minutes, but setup time is reduced with practice.

The table below outlines the steps required for configuring the PediaSIM ECS system.

	Setup Steps
1	Place the Mannequin in the Work Area
2	Attach the Umbilical Assembly to Mannequin
3	Connect the Fluidic/Pneumatic Umbilical to the PCU
4	Connect the Electrical Umbilical to the PCU
5	Set up the Instructor Workstation
6	Establish an Ethernet Connection
Optional	Set Up the TDCK
7	Power On the PCU
8	Power On the Instructor Workstation
9	Connect and Turn On the Compressed Air/CO_2
Optional	Set Up the Wireless Microphone
Optional	Configure the TouchPro and/or Wireless Remote Computers

Before Beginning

Proper operation of the PediaSIM ECS requires correct configuration. Before setting up the system, keep in mind these basic guidelines:

Understand the **Cautions/Warnings** information section of this User Guide.

Follow the sequence of steps carefully:

Complete all steps in order,

Do not power on any components until instructed in the text, and

Do not attach air/gas supplies until instructed in the text.

KEEP all original shipping materials, including the BOXES - warranty and repair items must be return-shipped to CAE Healthcare in their original packaging.

If unpacking the PediaSIM ECS system for the first time, careful use of a box cutter protects both the packaging and the product.

Because shipping materials should be stored and retained, ensure all protective packing materials and unused ancillary computer parts are secured as well.

Additional tools required for setup include:

Flathead screwdriver

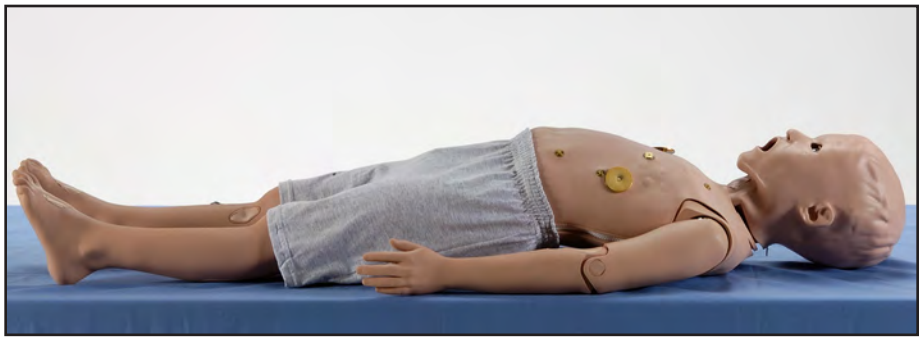
Paper towels/clean cloth

Power strip/surge protector

A Setup Map and Quick Start Chart cover these same steps in abbreviated fashion and are included with the PediaSIM ECS system.

Step 1: Place the Mannequin in the Work Area

Select a work area with enough room for the equipment as well as necessary hoses and cables, providing ample space for easy access to the mannequin. At least a 10' x 12' (3 meter x 4 meter) work area is recommended for movement and positioning of components around the mannequin.



The PediaSIM ECS Mannequin

In a lab environment, make sure that a multi-plug AC power outlet exists within the workspace. This outlet should be surge-protected. The PCU, Instructor Workstation, the OPTIONAL TouchPro computer and OPTIONAL Wireless Remote Control all require power in this configuration.

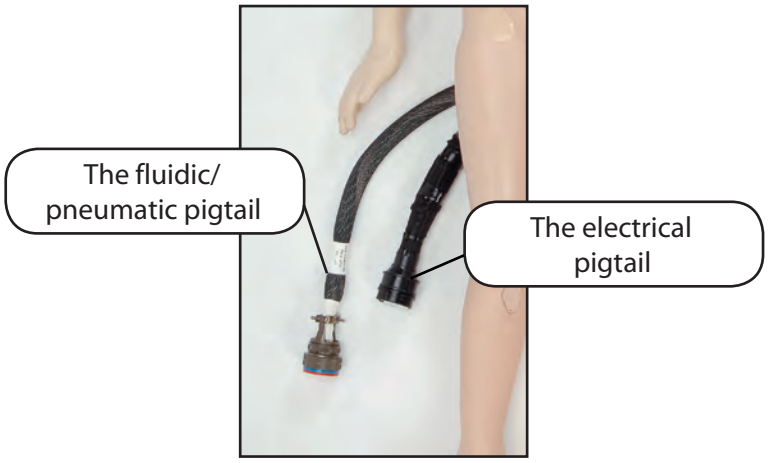
In a remote setting, the Air Compressor and Auxiliary Power Supply may take the place of laboratory gas and power supplies.

Before placing the mannequin on a surface, be certain that surface can easily support 38 pounds (17.2 kg).

NEVER lift the mannequin by the LIMBS. Leverage the torso of the mannequin and support the head while lifting.

Step 2: Attach the Umbilical Assembly to the Mannequin

The electrical pigtail and the bundled system of hoses called the fluidic/pneumatic pigtail are attached to the mannequin in the perineum area. Both pigtails attach to the Umbilical Assembly.



The Mannequin Pigtails

To attach the umbilical assembly to the mannequin:

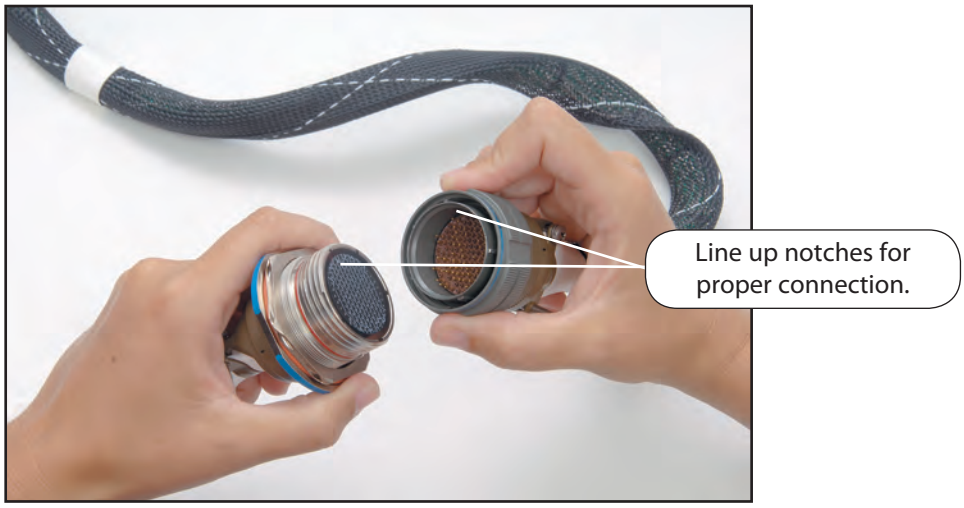
a. Attach the fluidic/pneumatic pigtail fitting to the Umbilical Assembly using the end with the rounded hose attachment, called the pneumatic coupler.

Fluidic/Pneumatic Connection to Umbilical

b. Once the two assemblies are fit into place, the tab lock secures them into position.

There are four unattached hoses coming from the Umbilical Assembly: red (IV Source), blue (IV Drain), orange (GU Source) and white (Trauma Source). These hoses are used in various clinical procedures and are discussed with those procedures later in this User Guide.

c. Connect the electrical cable from the Umbilical Assembly to the fitting on the electrical pigtail. Use the small notches on the inside edge of the pigtail as a guide when sliding the fittings together.



Electrical Connection to Umbilical

d. Once the two ends are connected, rotate the fitting on the outside portion of the connection clockwise until tight.

Tighten the Fitting

Step 3: Connect the Fluidic/Pneumatic Umbilical to the PCU

To connect the Fluidic/Pneumatic Umbilical to the PCU:

a. Position the PCU to allow enough space for movement around the mannequin without jeopardizing the 15-foot Umbilical Assembly that extends from the mannequin to the PCU.

b. Place the PCU case flat on the floor (like an open suitcase) and open the door to expose the PCU Interface Panel.

The PCU Positioned for Connections

NOTE: Do NOT plug in the PCU at this time.

c. Leave the power switch in the **OFF** position.

d. Attach the fluidic/pneumatic coupler to the lower **UMBILICAL** port on the PCU.

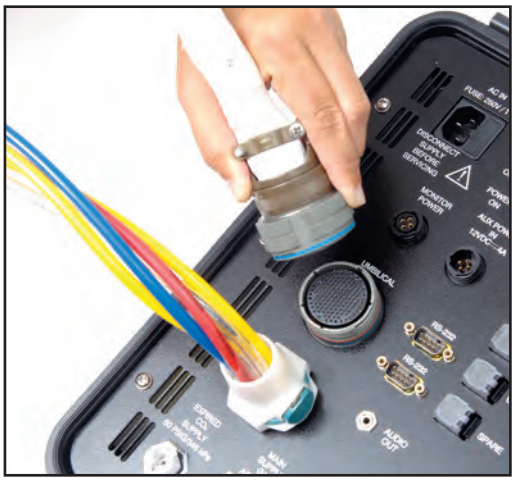
Connecting the Fluidic/Pneumatic Coupler to the PCU

The fitting slides into position and locks into place.

Step 4: Connect the Electrical Umbilical to the PCU

To connect the Electrical Umbilical to the PCU:

a. Attach the electrical portion of the umbilical to the upper **UMBILICAL** port.



Electrical Umbilical Connected to PCU

b. Line up the small tabs and notches on the fittings to slide them together before turning and tightening the connection.

Step 5: Set Up the Instructor Workstation

Place the Laptop or Tablet Instructor Workstation at the location (e.g., desk, table) where it will be used. Ensure the battery is charged or connect the Instructor Workstation to AC power.

Step 6: Establish the Ethernet Cable Connection

a. Plug one end of the Ethernet cable into the Laptop or Tablet Instructor Workstation.

b. Plug the other end of the Ethernet cable into the port on the PCU labeled **INSTRUCTOR WORK STATION**.

Connect the Ethernet Cable to the PCU

Optional: Set Up the TDCK

If the Trauma/Disaster Casualty Kit (TDCK) is to be used with the PediaSIM ECS system, set the TDCK up at this time using the instructions included in the TDCK User Guide.

Step 7: Power On the PCU

To power on the PCU:

a. In standard laboratory settings, plug the power cord into the PCU port labeled **AC IN**.

Connecting the Power Cord to the PCU

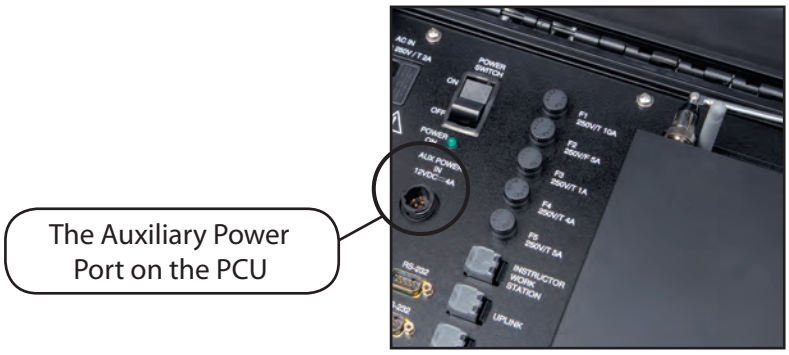
b. Connect the remaining end into a surge-protected AC power outlet.

c. Press the **POWER SWITCH** on the PCU into the **ON** position.

Powering On the PCU

STEP 7 – OPTIONAL If operating at a remote setting with the OPTIONAL Auxiliary Power Supply, connect the supplied power cable to the Auxiliary Power Supply before connecting the other end to the PCU port labeled **AUX POWER IN 12VDC**.

Power on the Auxiliary Power Supply before pressing the **PCU POWER SWITCH** to **ON**.



Locating the PCU's Auxilary Power Port

Step 8 - Option 1: Power on the Laptop Instructor Workstation

Power on the Laptop Instructor Workstation by pressing the Power button located to the upper right of the keyboard. The Instructor Workstation powers on and the desktop appears.

Step 8 - Option 2: Power on the Optional Tablet Instructor Workstation

Power on the Tablet Instructor Workstation by pressing the Power button on the side of the tablet computer. The computer automatically logs in and the desktop appears."

If the computer does not automatically log in, enter the Username *METI User* and leave the Password field blank.

Step 9: Connect and Turn On the Compressed Air/CO_2

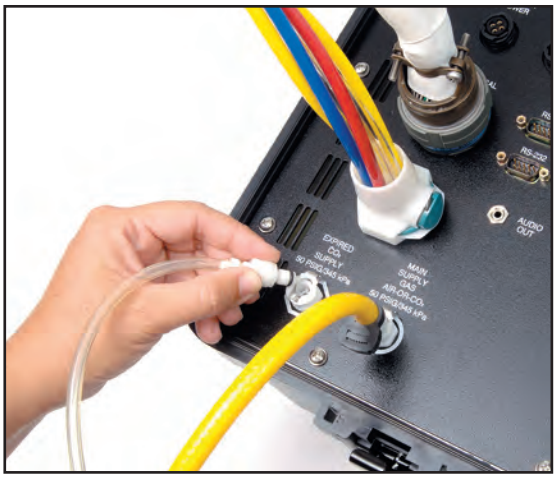
Connect either a compressed air source hose or a CO_2 supply hose to the port labeled MAIN SUPPLY GAS AIR-OR-CO_2. This connection provides either the air or carbon dioxide used to create various mannequin "life signs."

Connecting Air or CO_2 to the PCU

In remote settings, or in locations without a central air supply, an OPTIONAL Air Compressor is connected to the PCU at the MAIN SUPPLY GAS AIR-OR-CO_2 port. This system is factory-calibrated to apply pressure only at 50 psig/345 kPa.

The OPTIONAL Gas Accessory Kit is available for locations with a central air and gas supply. The regulators included with the assemblies are user-adjustable to psig/345 kPa.

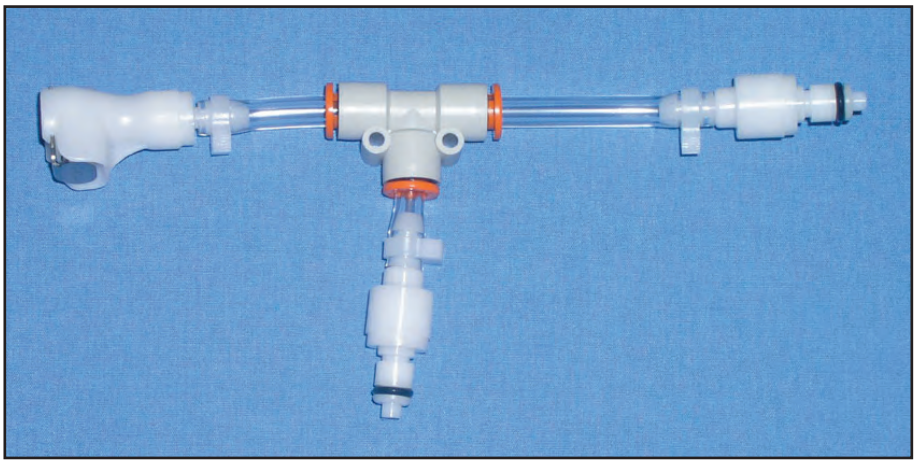
For the mannequin to expire CO_2, attach a clear CO_2 source hose to the EXPIRED CO_2 SUPPLY port.



Connecting Expired CO_2 to PCU

CO_2 sources must be pressurized to 50 psig/345kPa.

In remote settings, or in locations without a central gas supply, the OPTIONAL CO_2 Adapter connects with a portable CO_2 supply and the PCU to enable the mannequin to expire CO_2 and operate off the portable gas source.



OPTIONAL CO_2 Adapter

The branches of the Y-shaped adapter are connected to the MAIN SUPPLY GAS AIR-OR-CO_2 and the EXPIRED CO_2 SUPPLY ports and the remaining connection is made to the portable CO_2 supply.

After the PCU and Instructor Workstation are powered on, turn on the compressed air or the CO_2 being used as the main gas supply.

Compressed air and gas sources must be pressurized to 50 psig/345 kPa.

Optional: Set Up the Wireless Microphone

To use the Wireless Microphone:

1. Unfold the two antennas located on the front the Wireless Receiver on the PCU.
2. Attach the lapel microphone to the desired piece of clothing or surface.
3. Turn on the microphone using the switch on the top of the unit.

Optional: Configure the TouchPro and Wireless Remote Computers

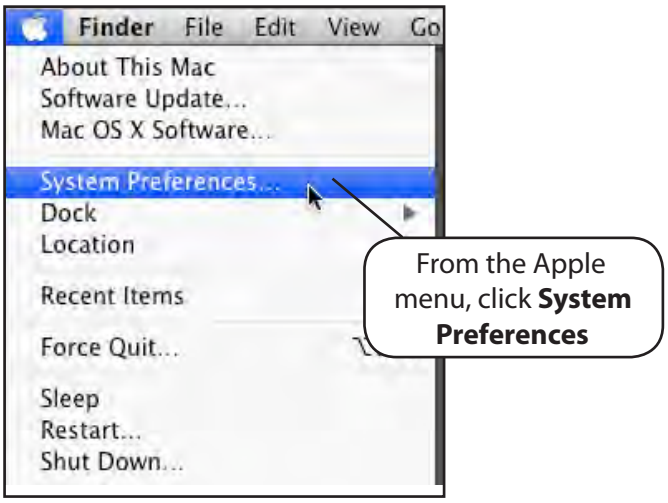
The PediaSIM ECS network supports up to four computers: the Instructor Workstation, and three computers (a Wireless Remote Control and two TouchPro workstations). All computers must meet the system requirements mapped out in the **Specifications** section of this User Guide. Follow the steps below to be able to use the Müse or TouchPro software on either a TouchPro computer or a Wireless Remote computer.

Step 1 – Set Up the PediaSIM ECSi

The PediaSIM ECS simulator must be set up and powered on, and the Instructor Workstation must be connected to the PediaSIM ECS Network via the Ethernet connection to the PCU. *Please refer to page 35 of this User Guide for directions on how to setup the PediaSIM ECS.*

Step 2 – Obtain the IP Address from the Laptop Instructor Workstation

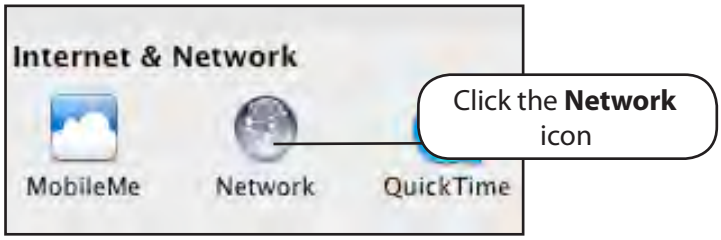
a. On the Instructor Workstation that is connected to the PediaSIM ECS Network, from the **Apple** menu, click **System Preferences.**



Accessing the System Preferences

The System Preferences dialog box appears.

b. On the System Preferences dialog box, click the **Network** icon.



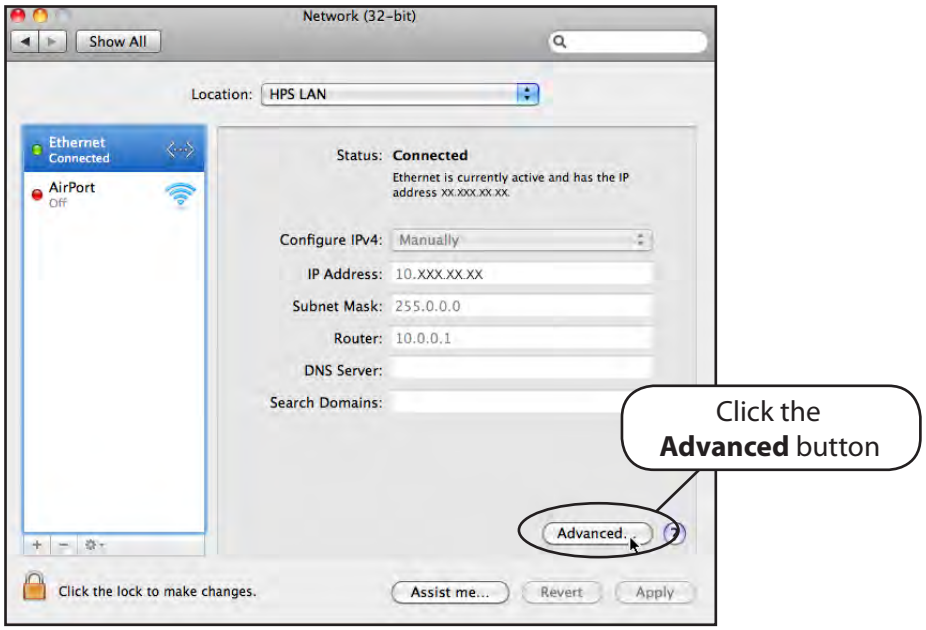
Clicking the Network Icon

The Network dialog box appears.

c. On the panel on the left side of the Network dialog box, select **Ethernet** and ensure it is connected.

Select Ethernet

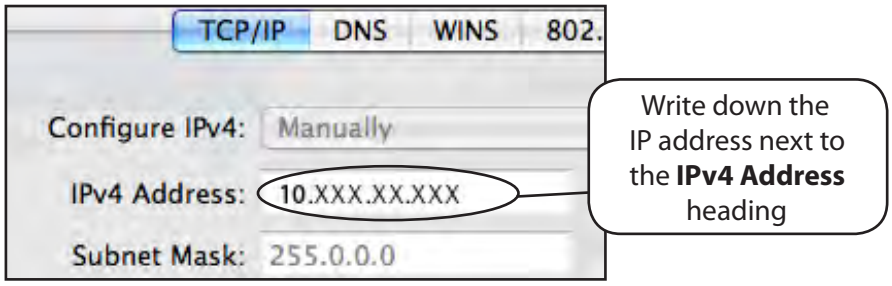
d. From the bottom, right-hand corner of the Network dialog box, click the **Advanced** button.



Clicking the Advanced Button

The TCP/IP Network screen appears.

e. Write down the IP address next to the **IPv4 Address** heading.



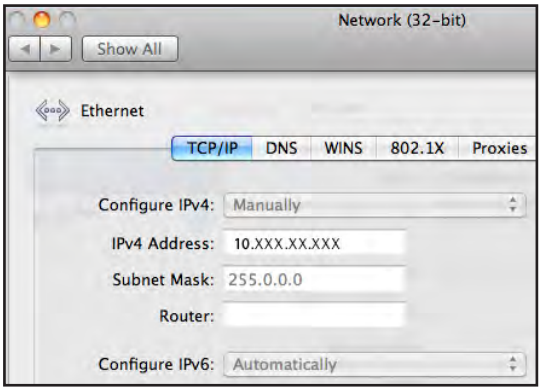
The Instructor Workstation's IP Address

f. Click **Cancel** to close the TCP/IP Network screen.

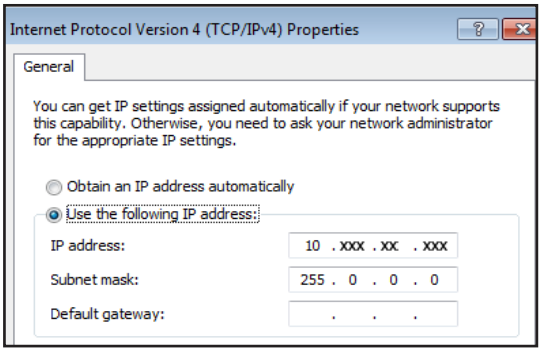
g. Close the Network settings screen.

Step 3 – Configure the Wireless Remote/TouchPro Computer's Network Settings

Access the Networking screens (the TCP/IP settings screens) for your operating system. If you are unfamiliar with these screens, contact your Network Administrator or CAE Healthcare Customer Support (1-866-462-7920) for help with this step.



TCP/IP Network Screen – Macintosh


Internet Protocol Version 4 (TCP/IPv4) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
10 . XXX . XX . XXX
Subnet mask:
255 . 0 . 0 . 0
Default gateway:

Internet Protocol Version 4 (TCP/IPv4) Properties Screen – Windows

The unique IP address must match the IP address obtained in **Step 2** except for the number after the third and final period. This number can be any number between 2 and 254 BUT must be different from the final number of the IP address of the Instructor Workstation and any other computers on the network. No two IP addresses can be the same, including the Instructor Workstation's IP address.

Unique IP Address: 10.XXX.XX.XXX

Subnet Mask: 255.0.0.0

Router/Gateway: (Leave Blank)

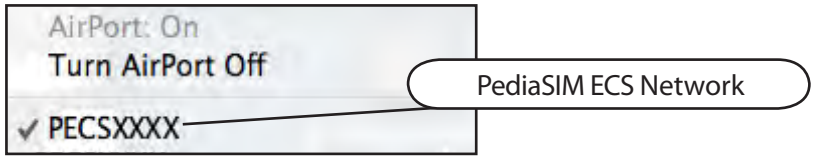
Example: If the IP address of your Instructor Workstation is 10.127.91.223, you could assign the TouchPro computer the IP address 10.127.91.224 and the Wireless Remote computer the IP address 10.127.91.225.

Step 4 – Option 1: Join the PediaSIM ECS Network Using a Macintosh Operating System

a. Click the **AirPort** icon located at the top, right-hand corner of the screen of the TouchPro or Wireless Remote Computer.

A list appears with the PediaSIM ECS network listed.

b. Select the **AirPort** network labeled *PECSXXXX* (where "XXXX" is the unit number of your PediaSIM ECS).



Selecting the PediaSIM ECS Network

An AirPort dialog box appears requesting the password for the PediaSIM ECS network.

c. Enter the password. *** See the note at the end of this step.*

d. Click **OK**.

Clicking OK

The computer has joined the PediaSIM ECS network. You can now proceed to **Step 5**.

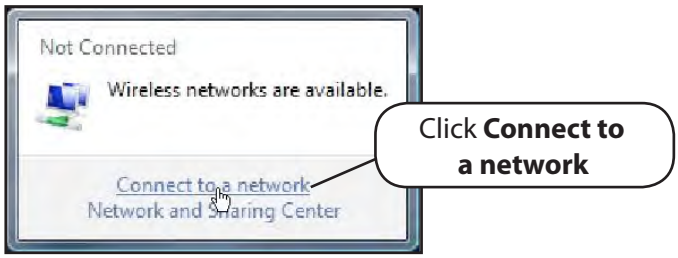
***The PediaSIM ECS WPA password contains eight characters. The password is PECS, followed by four numbers. The numbers are the PediaSIM ECS unit number preceded by the number of zeros required to make the password total eight characters. (Examples: PECS0123, PECS0012 or PECS0001, where 123, 12 or 1 is the PediaSIM ECS unit number.) The password is case sensitive, and PECS is typically all capital letters.*

Step 4 – Option 2: Join the PediaSIM ECS Network Using a Windows Operating System

a. Click the **Wireless Network** icon located in the bottom, right-hand corner of the screen of the TouchPro Computer.

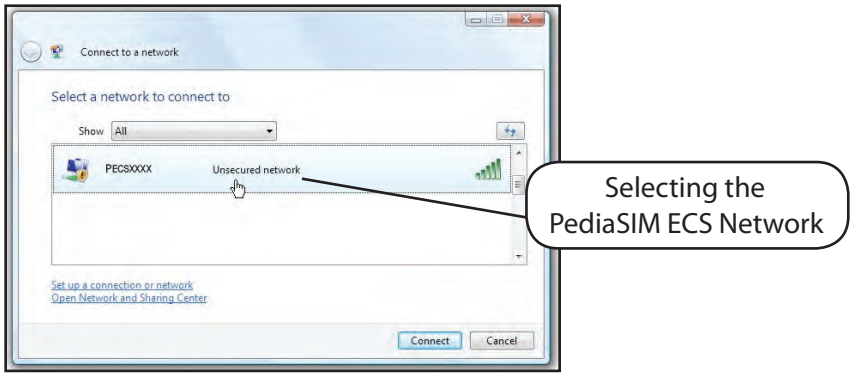
Clicking the Wireless Network Icon

b. Click **Connect to a network**.



Clicking Connect to a Network

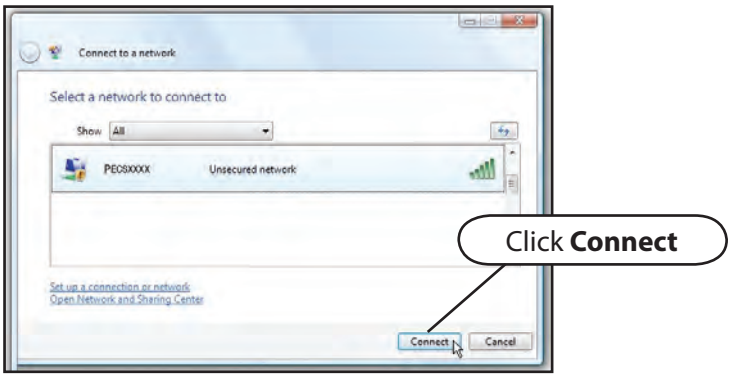
c. Select the network labeled *PECSXXXX* (where "XXXX" is the unit number of your PediaSIM ECS).



Selecting the PediaSIM ECS Network

d. Enter the Password. *** See note at the end of this step.*

e. Click **Connect**.



Clicking Connect

The computer has joined the PediaSIM ECS network. You can now proceed to **Step 5**.

***The PediaSIM ECS WPA password contains eight characters. The password is PECS, followed by four numbers. The numbers are the PediaSIM ECS unit number preceded by the number of zeros required to make the password total eight characters. (Examples: PECS0123, PECS0012 or PECS0001, where 123, 12 or 1 is the PediaSIM ECS unit number.) The password is case sensitive, and PECS is typically all capital letters.*

Step 5 – Access the Software from the TouchPro or Wireless Remote Computer

a. On the TouchPro computer or Wireless Remote computer, launch the web browser, (e.g., Safari®).

b. Enter the IP address obtained in **Step 2** into the browser's address field. The Müse Start screen appears.

The Müse Start Screen

The Müse software or the TouchPro software can now be launched, and the software can be used in the same fashion as on the Instructor Workstation.

OPTIONAL: From your web browser, a bookmark can be created on the TouchPro or Wireless Remote computer for ease of access to the Müse or TouchPro software. Please consult your web browser's help menu for aid in creating a bookmark.

IMPORTANT: The Instructor Workstation MUST remain on and connected to the PediaSIM ECS network for the Wireless Remote or TouchPro computers to be able to operate.

Using Müse

The Müse software is a browser-based application that can communicate directly with the simulator.

With the software, users can run SCEs, create scenarios and SCEs, import and export educational content and perform administrative functions.

NOTE: For optimal Müse performance, no other software programs should be open while Müse is running.

IMPORTANT: Only one Müse application window or tab and one TouchPro window or tab can be used per Instructor Workstation at a time.

IMPORTANT: Do NOT use any of the browser's navigational tools (i.e., back and forward buttons) while operating Müse.

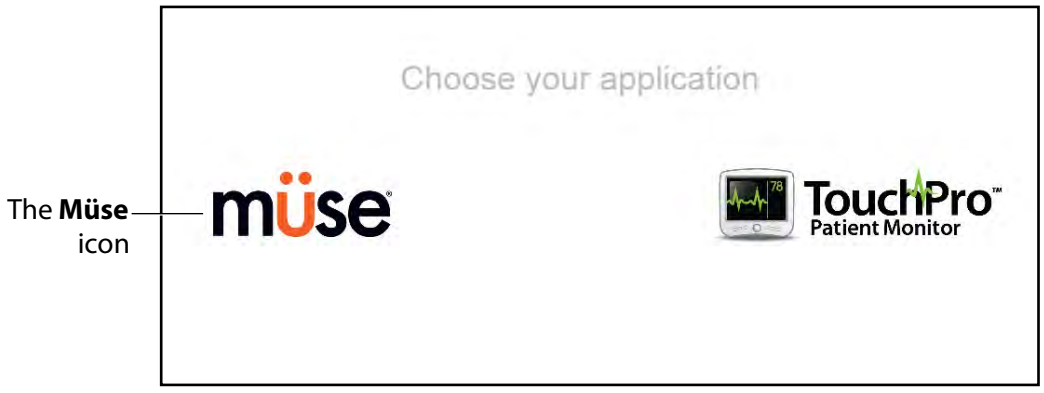
Starting the Application

Once the simulator is powered on and the Instructor Workstation is connected to the simulator network, the Müse software can be launched.

To launch the software:

1. Using the Laptop or Tablet Instructor Workstation, launch the web browser (e.g., Safari, Internet Explorer)

   The Müse Start Screen appears.



The Müse Start Screen

2. Select **Müse**.

   The Login screen appears.

The Müse Login Screen

The links in the bottom left corner of the screen provide access to additional information about the software:

- Click the **About** link to access information about the Müse software version, the type of simulator and the serial number.
- Click the **User Guide** link to download the user guide (English version). To access the User Guide in other languages, please visit www.caehealthcare.com and click the **Support** link.
- Click the **Support** link for CAE Healthcare Support contact information.
- Click the globe-shaped **Language** icon in the bottom left corner to change the language of the Müse software.

3. On the Login screen, enter the **Username** *admin* and the **Password** *admin* in the appropriate fields to access Müse.

The Müse Login Fields

Müse opens to the Home page by default.

Navigating the Home Page

From the Home page, users can run, create, edit, search for and print SCEs.

The Home page can be accessed by clicking the **Home** button in the upper right corner of the Müse software or, on any screen without a **Home** button, by clicking the **Return** button in the upper left or right corner of the screen.

müse
All
Accidental Electrocution
Kevin Becker
Accidental Overdose
Ruby Johnson
Closed Head Injury
Donnell Maston
Diabetic Ketoacidosis with Hypoxemia
Natalie Rosa
Healthy Female Child
Emily Liu
Healthy Male Child
Andy Stevenson
Obstructed Airway
Andrew Carlson
Page 1 / 2
Open Library
New SCE...
Accidental Electrocution
Kevin Becker
Print SCE
Add To Favorites
Age 6 years old
Gender Male
Weight 22.0 kg
Base Andy Stevenson
Overview
This Simulated Clinical Experience (SCE) can be placed in several locations, depending on the background of the learner or healthcare provider. The events can take place in the patient's home or in an ambulance, or the patient can be presented as a new arrival to the Emergency Department (ED).
A 22 kg, six-year-old male child was found unresponsive in the supine position next to an electrical cord. The father states he was working on the electrical box. When the father turned his back on the child for a few seconds, the patient came in contact with the electrical source.
This SCE consists of five states that are transitioned manually at the facilitator's discretion, with the exception of State 2 and State 3, which automatically transition.
In State 1 Cardiac Arrest, the patient demonstrates a HR in the 100s to 230s, BP 0, RR 0 and SpO2 is not detectable. The cardiac rhythm reveals coarse ventricular fibrillation. The patient is unresponsive, and the pupils are nonreactive. The temperature is 37.3 C. Breath sounds are clear with ventilation.
The learner is expected to survey the scene for safety, use standard precautions, complete a primary assessment and initiate PALS following the appropriate algorithm, administer oxygen via bag valve mask and establish IV access. The SCE transitions to the next state at the facilitator's discretion.
Review
Run
About
User Guide
Support
meti admin

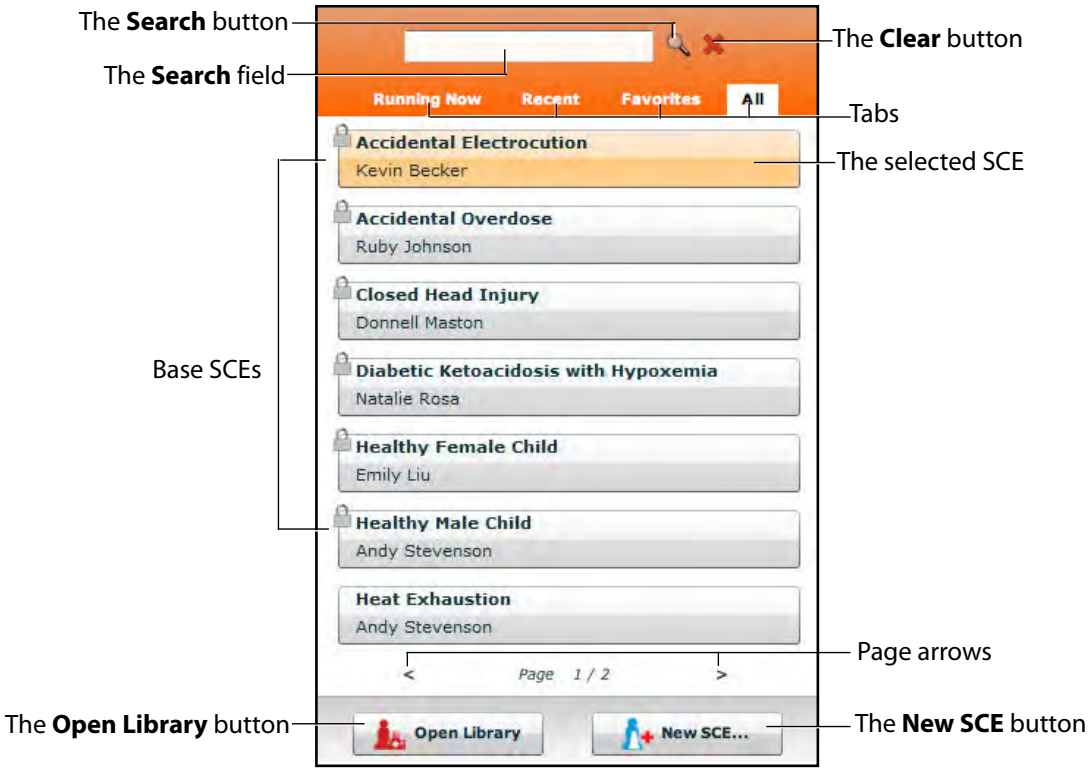
The Home Page

NOTE: To activate a fullscreen view in Internet Explorer, press F11 to toggle Internet Explorer's fullscreen mode.

The SCE Selection Panel

SCEs are process tools that enable the facilitator to execute a learning strategy using simulation. Preconfigured CAE Healthcare SCEs provide an extensive overview and outline of the learning exercise and require minimal additional faculty development time for use. Each SCE is comprised of a patient and up to four scenarios.

Available SCEs appear in the SCE Selection panel on the Home page.



The SCE Selection Panel

The SCE Selection panel has four tabs that access SCEs: Running Now, Recent, Favorites and All.

- **Running Now** tab: Lists the SCEs that are currently running and is only available when at least one SCE is running.
- **Recent** tab: Lists all the recently run or edited SCEs.
- **Favorites** tab: Lists all SCEs that have been selected as favorites and is only displayed after favorites have been selected. To add a favorite SCE to your profile, click the **Add to Favorites** button at the top of any SCE on the Home page. Managing favorites is achieved in the Account Profile portion of the software.
- **All** tab: Lists all SCEs, including user-created SCEs and all SCEs from available learning modules.

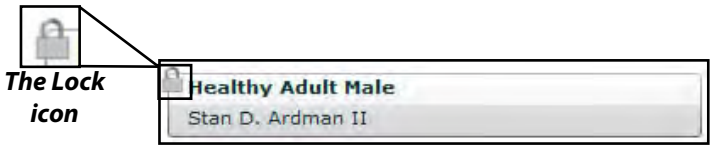
To search for an installed SCE, enter part of the name of an SCE in the **Search** field and click the **Search** button.

Click any SCE to select it. Once an SCE is selected, it appears in the SCE Summary panel.

To run an SCE, click **Run** in the SCE Summary panel to execute the SCE. A running SCE appears in orange with an X icon.

Base SCEs are created by CAE Healthcare and represent base patient physiology. Base SCEs have no associated scenarios and no physiological progressions.

The **Lock** icon indicates a locked SCE.



A Locked SCE

Locked SCEs are installed by CAE Healthcare and cannot be deleted. Base and preconfigured SCEs are locked.

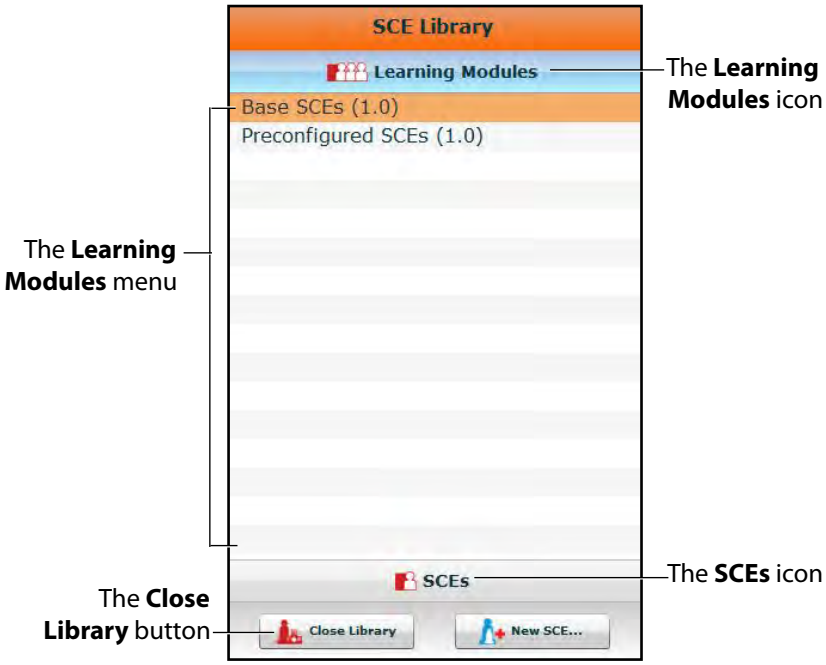
Click the page arrows to view additional pages of installed SCEs.

To open the SCE Library, click the **Open Library** button.

To create a new SCE, click the **New SCE** button.

The SCE Library

Access SCEs from your library by clicking the **Open Library** button at the bottom of the SCE Selection panel. The SCE Library appears.



The SCE Library

The Learning Modules menu is open by default. The Learning Modules menu lists Base SCEs, Preconfigured SCEs and all installed learning applications. Click the desired learning application name to access its SCEs, or click Base SCEs or Preconfigured SCEs. The selected SCEs appear.

Clicking the **SCEs** icon reveals the SCEs menu, which lists all user-created SCEs.

Clicking the **Learning Modules** icon again reveals the Learning Modules menu.

To open an SCE, click the name of the SCE.

Click **Close Library** to exit the SCE Library.

Base SCEs

Base SCEs are fundamental SCEs with no scenarios and no progression of events. Each base SCE is designed to provide facilitators with a baseline to run simulations "on the fly" or as a physiological baseline from which to design their own SCEs.

To access a base SCE from the SCE Library, choose **Learning Modules**, then click **Base SCEs**. The base SCEs are displayed and available for selection.

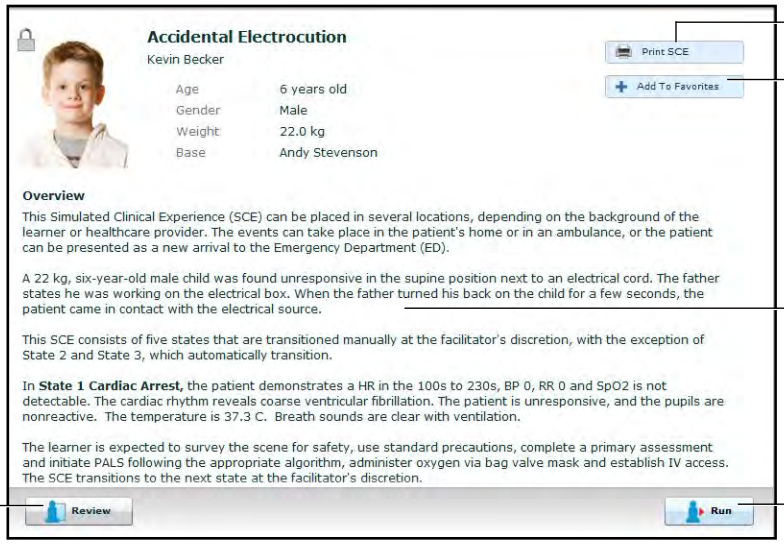
Preconfigured SCEs

Preconfigured SCEs are training tools with scenarios and multiple states. They are intended to be used for learner education and training.

To access a preconfigured SCE from the SCE Library, choose **Learning Modules**, then click the name of the SCE category. The SCEs in the chosen category are displayed and available for selection.

The SCE Summary Panel

The SCE Summary Panel provides information about the selected SCE.


Accidental Electrocution
Kevin Becker
Age 6 years old
Gender Male
Weight 22.0 kg
Base Andy Stevenson
Print SCE
Add To Favorites
Overview
This Simulated Clinical Experience (SCE) can be placed in several locations, depending on the background of the learner or healthcare provider. The events can take place in the patient's home or in an ambulance, or the patient can be presented as a new arrival to the Emergency Department (ED).
A 22 kg, six-year-old male child was found unresponsive in the supine position next to an electrical cord. The father states he was working on the electrical box. When the father turned his back on the child for a few seconds, the patient came in contact with the electrical source.
This SCE consists of five states that are transitioned manually at the facilitator's discretion, with the exception of State 2 and State 3, which automatically transition.
In State 1 Cardiac Arrest, the patient demonstrates a HR in the 100s to 230s, BP 0, RR 0 and SpO2 is not detectable. The cardiac rhythm reveals coarse ventricular fibrillation. The patient is unresponsive, and the pupils are nonreactive. The temperature is 37.3 C. Breath sounds are clear with ventilation.
The learner is expected to survey the scene for safety, use standard precautions, complete a primary assessment and initiate PALS following the appropriate algorithm, administer oxygen via bag valve mask and establish IV access. The SCE transitions to the next state at the facilitator's discretion.
Review
Run
The Print button
The Add to Favorites button
The SCE Content Summary
The Review button
The Run button

The SCE Summary Panel

The **Print SCE** button can be used to generate a printable PDF of the selected SCE.

The **Add to Favorites** button adds the SCE to your Favorites list.

Clicking the **Review** button accesses the SCE Editor, which can be used to review and edit SCEs.

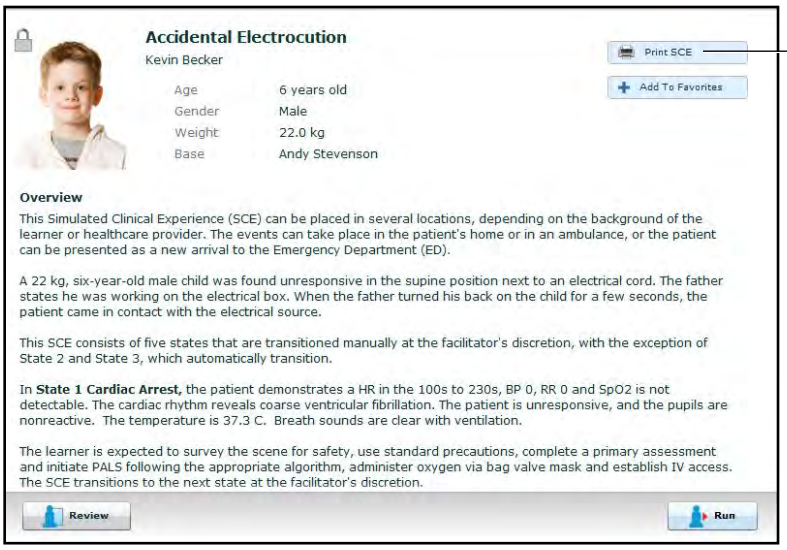
Select the **Run** button to run the SCE.

Printing SCEs

To print an SCE:

1. From the Home page, select the SCE to print.

   The SCE summary panel appears.


Accidental Electrocution
Kevin Becker
Print SCE
Add To Favorites
Age 6 years old
Gender Male
Weight 22.0 kg
Base Andy Stevenson
Overview
This Simulated Clinical Experience (SCE) can be placed in several locations, depending on the background of the learner or healthcare provider. The events can take place in the patient's home or in an ambulance, or the patient can be presented as a new arrival to the Emergency Department (ED).
A 22 kg, six-year-old male child was found unresponsive in the supine position next to an electrical cord. The father states he was working on the electrical box. When the father turned his back on the child for a few seconds, the patient came in contact with the electrical source.
This SCE consists of five states that are transitioned manually at the facilitator's discretion, with the exception of State 2 and State 3, which automatically transition.
In State 1 Cardiac Arrest, the patient demonstrates a HR in the 100s to 230s, BP 0, RR 0 and SpO2 is not detectable. The cardiac rhythm reveals coarse ventricular fibrillation. The patient is unresponsive, and the pupils are nonreactive. The temperature is 37.3 C. Breath sounds are clear with ventilation.
The learner is expected to survey the scene for safety, use standard precautions, complete a primary assessment and initiate PALS following the appropriate algorithm, administer oxygen via bag valve mask and establish IV access. The SCE transitions to the next state at the facilitator's discretion.
Review
Run
The **Print SCE** button

The SCE Summary Panel

2. From the SCE summary panel, click the **Print SCE** button.

   A PDF of the selected SCE appears in a new browser window.

3. Save the PDF to an external storage device to print from another computer,

   OR

   To print from the Instructor Workstation, consult your network administrator for assistance connecting to a printer.

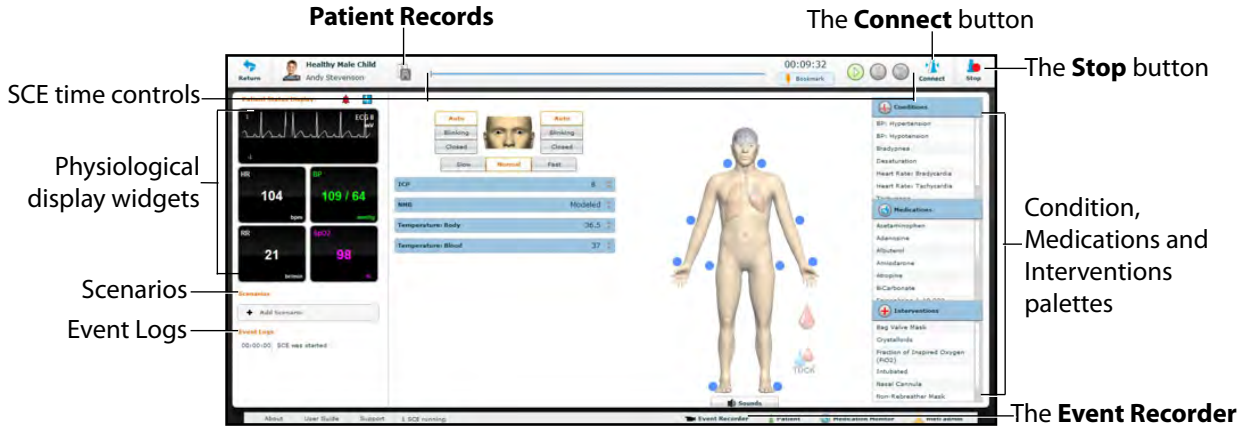
4. When finished saving or printing the PDF, close the browser window containing the PDF to return to Müse.

Running an SCE

To run an SCE, from the Home screen, select an SCE and click the **Run** button. The Run screen can also be accessed from the Scenario Designer or SCE Editor by clicking the **Run** button near the top of the screen.

The Run Button

The Run screen appears.



The Run Screen

From the Run screen, users can manage the SCE, perform interventions, view physiological status and events, save events as states, save the Patient and associate records with the Patient.

Connecting to the Simulator

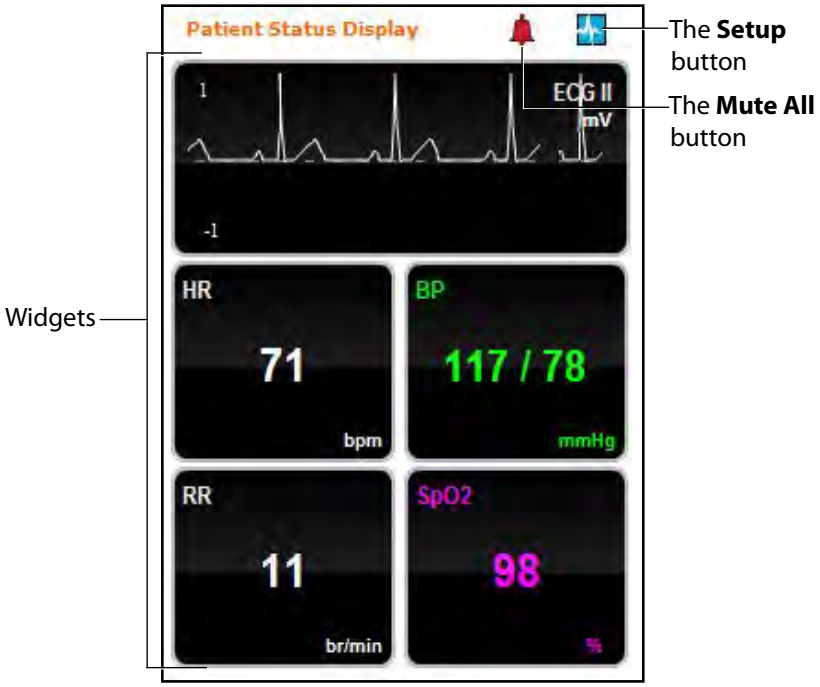
After starting an SCE by clicking the **Run** button, click **Connect** to connect to the simulator. The **Connect** button is located in the upper right corner of the Run screen.

The Connect Button

An SCE must be running before you can connect to the simulator.

Using the Patient Status Display

On the Run screen, there are widgets that display the patient's physiological status. The **Patient Status Display** widgets can be changed to reflect the user's needs. There are six available display spaces for the widgets. Waveform widgets utilize two display spaces.

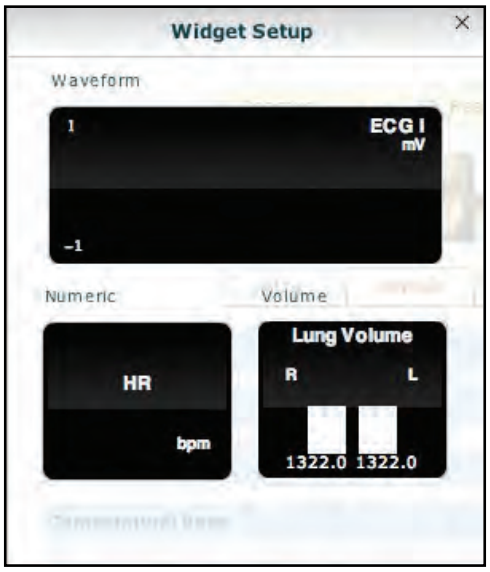


The Patient Status Display Widgets

Use the **Mute All** button to mute all Patient Status Display alarms.

To adjust the widget layout, click the **Setup** button.

The Widget Setup menu opens, displaying available widget types: Waveform, Numeric and Volume.



The Widget Setup Menu

Adjust the Patient Status Display layout by dragging a widget type from the Widget Setup Menu and dropping it over the Patient Status Display. The new widget type replaces the old.

To change a **Patient Status Display** widget, click the widget to be changed. A list of available parameters appears.

Choose the desired option from the list and the widget changes to reflect the new selection.

From the numeric widget menu, you can also use the **Set Color** button to change the display color of the widget and the **Set Alarm** button to change the alarm settings for the selected widget.

The Event Logs

During an SCE, all software operations sensed by the simulator or entered manually (e.g., virtual defibrillation) are recorded by an event entry that appears on the screen. The event entry notes what occurred and the time it happened.

The Event Logs

Event Logs can also be exported. For more information, see *History on page 129*.

Displaying Patient Records

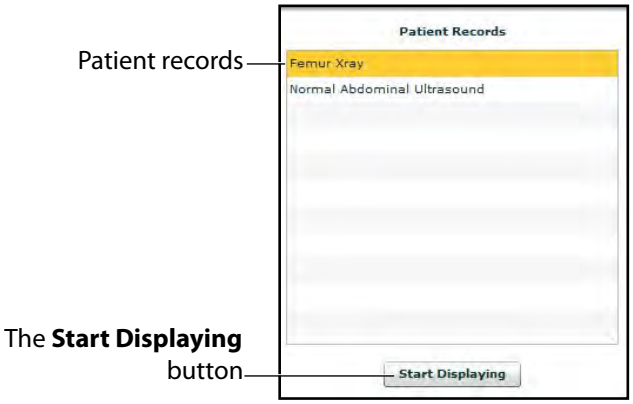
Patient records can be uploaded to Müse and displayed in the TouchPro software while an SCE is running.

To display an uploaded patient record:

1. From the Müse Run screen, click the **Patient Records** button.

The Patient Records Button

The Patient Records list appears, displaying all available patient records.



The Patient Records List

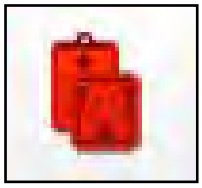
2. Select a patient record from the list.
3. Click **Start Displaying**.

   The patient record is shown in a new TouchPro web browser window.

   IMPORTANT: Ensure pop-up blocking is turned OFF in the web browser of the Instructor Workstation and any TouchPro workstations. Consult the web browser's help menu for assistance.

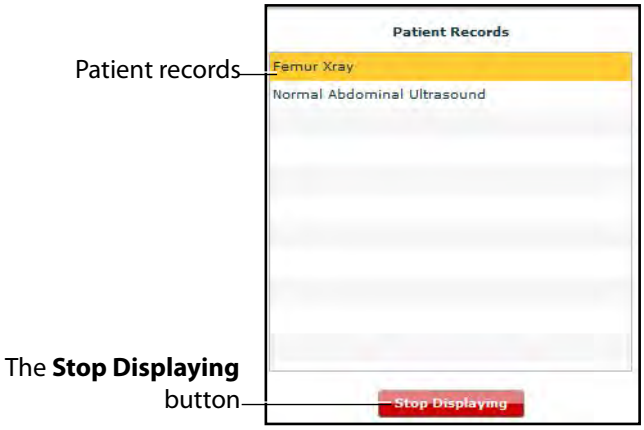
   NOTE: The web browser window containing the patient record may be minimized initially. If the window is not readily visible, click the web browser icon on the Dock (Macintosh Instructor Workstation) or Taskbar (Windows Instructor Workstation) to locate the new window.

The **Patient Records** button turns red, indicating that a patient record is being displayed.



The Patient Records Button

The **Start Displaying** button at the bottom of the Patient Records list changes to a red **Stop Displaying** button.



The Patient Records List

To stop displaying a patient record, click **Stop Displaying** at the bottom of the Patient Records list.

To close the Patient Records list, click the **Patient Records** button. The list closes. If a patient record is being displayed, the **Patient Record** button remains red until the list is re-opened and **Stop Displaying** is chosen.

NOTE: Only one patient record can be displayed at a time.

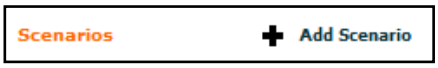
For information about uploading patient records to Müse for selection from the Run screen, see *Patient Records on page 138*.

Adding a Scenario to a Running SCE

SCEs incorporate scenarios that contain pre-programmed physiology. Scenarios can be added to SCEs to enhance patient physiology.

To add a scenario to an SCE that is running:

1. Click the **Add Scenario** button on the Run screen



The Add Scenario Button

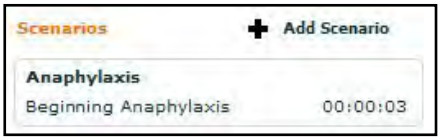
   The Choose Scenario dialog box appears.

2. Select a scenario from the Choose Scenario Dialog Box.

   The **Search** field can be used to search for a scenario to select.

3. Click **Add**.

   The scenario is added to the SCE and appears under the **Scenarios** heading on the Run screen.



An Added Scenario

Changing Physiology

The patient physiology can be adjusted while an SCE is running in two ways: by using one of the physiological views on the Run screen to modify parameters or by using the Conditions, Interventions and Medications palettes.

Using the Physiological Views

From the Run screen, users can select from six different views representative of various body systems and features:

Neurological

Respiratory

Cardiovascular

Fluids

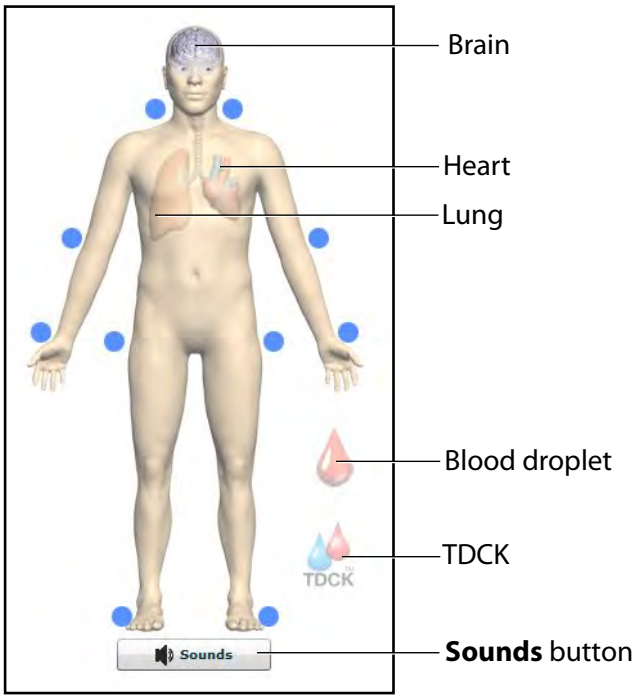
TDCK

Sounds

To access each view, click the appropriate organ, icon or button.

- For Neurological, click the brain.
- For Respiratory, click the lung .
- For Cardiovascular, click the heart.
- For Fluids, click the droplet of blood.
- For TDCK, click the TDCK icon
- For Sounds, click the **Sounds** button.

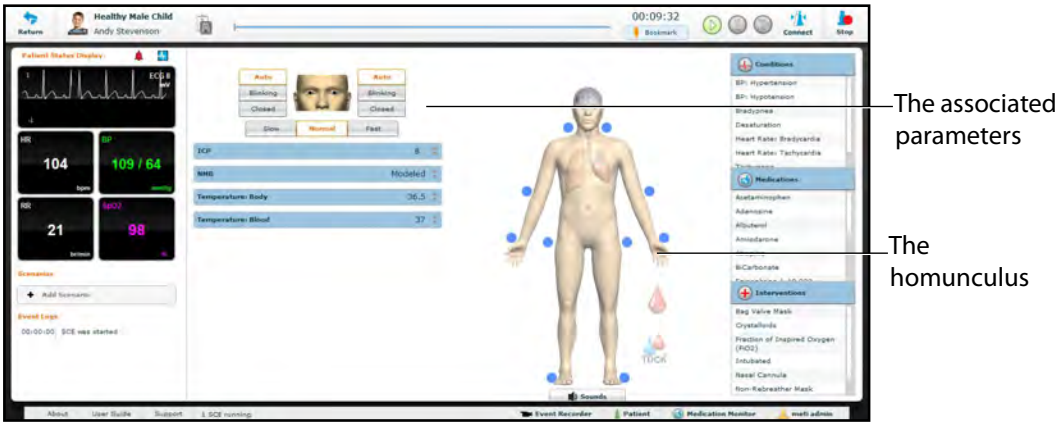
From each view, various parameters can be viewed and adjusted.



The Physiological Views

To change a patient's physiology using the physiological view:

1. Click the appropriate organ, icon or button from the homunculus to select the appropriate physiological view.



The Run Screen

The associated parameters appear to the left of the homunculus.

2. Locate the desired parameter.
3. Select the parameter and set the new value.

Parameters have varying controls, such as sliders, switches and menus. In the image below, the Heart Rate parameter is shown. Within the Heart Rate parameter, there are switches that toggle between **Modeled** and **Override** and **Seconds** and **Minutes**, a slider that sets the beats per minute and it's an available field where the beats per minute value can be keyed in.

The Heart Rate Parameter

Once the parameter has been set, it is reflected in the patient's physiology.

Types of Parameters

There are two types of parameters: numeric and discrete.

Once a parameter is selected and set, the patient's physiology changes according to the model for that parameter.

Numeric Parameters

Numeric parameters set either a measured value (e.g., 20 mL) or a multiplied value called a factor (e.g., Heart Rate Factor 2.0 is two times the baseline Heart Rate).

Numeric parameters are changed by clicking in the relevant field and entering a new value in place of the existing one or using a slider to move through the range of parameter values until the desired numeric value is established.

Once a measured value is set, that value overrides the physiologically modeled parameter value. To return to a physiologically modeled value, switch the slider in the parameter dialog from **Override** to **Modeled**.

Discrete Parameters

Discrete parameters enable users to select one of two or more options.

Discrete parameters are changed by choosing the appropriate option using a drop-down menu or toggle switch.

In the image below, the Needle Decompression parameter is shown. The Needle Decompression parameter is set using a discrete parameter switch that toggles between **Off** and **On**.

The Needle Decompression Switch

Once the parameter has been set, it is reflected in the patient's physiology.

NOTE: Not all changes to parameters affect the patient's physiology, but all are logged.

Using the Conditions, Medications and Interventions Palettes

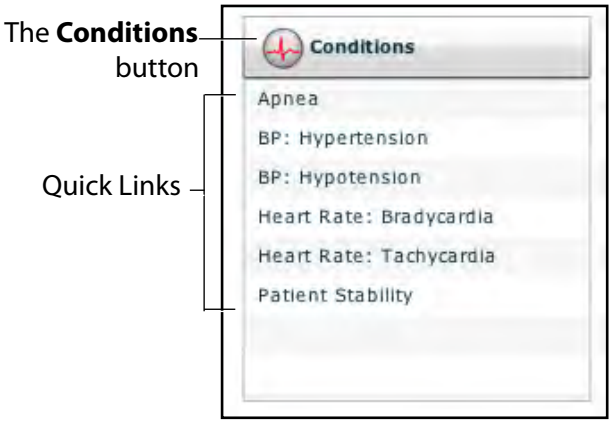
The Conditions, Medications and Interventions palettes on the Run screen enable the application of conditions, medications and interventions during simulation. Once applied, conditions are reflected in the patient's physiology and logged. All medications and interventions are also logged, and most affect the patient's physiology.

Using the Conditions Palette

Conditions are preprogrammed pathophysiological states that use one or more physiological parameters and are designed to enable you to create physiological changes on the fly.

There are two ways to apply conditions using the Conditions palette: using a Quick Link or using the complete Conditions menu. Quick Links are preconfigured conditions that are made accessible in the Conditions palette for quick application. Quick Links can also be created for the **Medications** and **Interventions** palettes.

To set parameters using the Quick Links in the **Conditions** palette, click one of the Quick Links. The condition is applied and affects the patient's physiology.



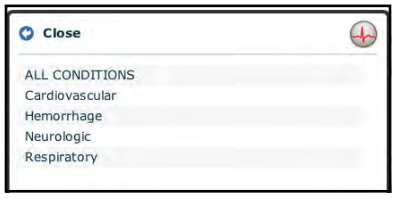
The Conditions Palette

NOTE: Quick Links can only be added while creating or editing an SCE.

Or, to apply a condition that is not set up as a Quick Link in the **Conditions** palette:

1. Click the **Conditions** button.

   The Conditions menu appears. Conditions are organized by system, or all available conditions are listed under **ALL CONDITIONS**.



The Conditions Menu

2. Navigate the menus to find the desired condition.

   Once the desired condition has been located, click the condition's name from the list.

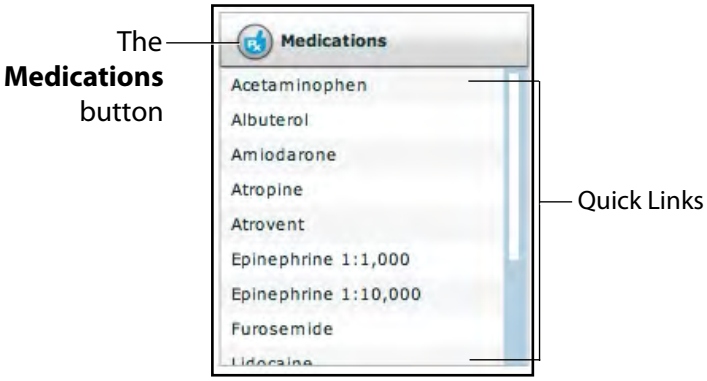
   The condition is applied and affects the patient's physiology.

Using the Medications Palette

There are two ways to administer medications using the **Medications** palette: using a Quick Link or using the **Medications** menu. Quick Links are preconfigured medications that are made accessible in the **Medications** palette for quick application. Quick Links can also be created for the **Conditions** and **Interventions** palettes.

To set parameters using the Quick Links in the **Medications** palette, click a Quick Link. The medication is applied and appears in the patient's physiology.

NOTE: Not all medications affect the patient's physiology, but all are logged.



The Medications Palette

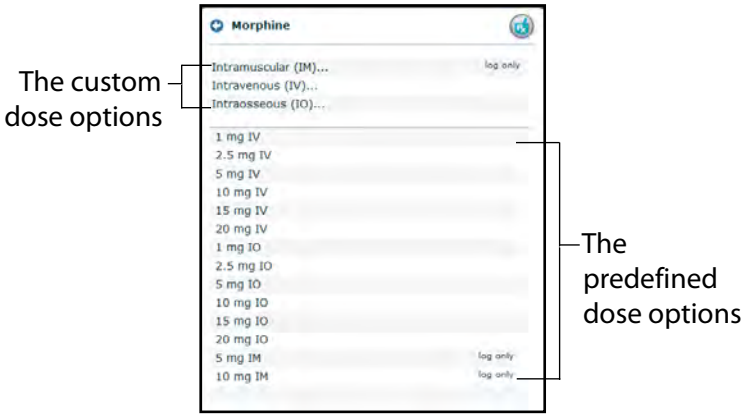
NOTE: Quick Links can only be added while creating or editing an SCE.

Or, to apply a medication that is not set up as a Quick Link in the **Medications** palette:

1. Click the **Medications** button. Medications are organized by type, and all available medications are listed under **ALL MEDICATIONS**.
2. Navigate through the menus to locate the desired medication.
3. Once the medication has been located, click the medication's name from the list.

The All Medications Menu

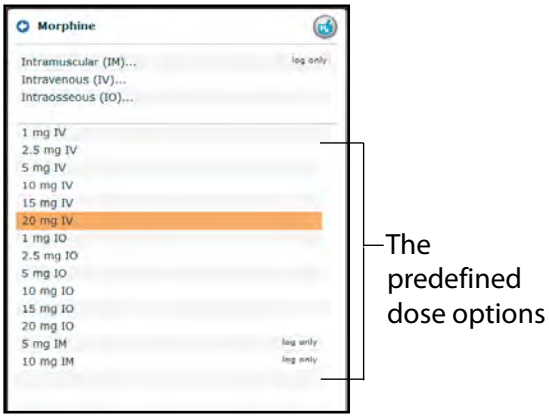
The Medication Dose menu appears, displaying the pre-defined does and custom does routes for the chosen medication.



The Medication Dose Menu

4. Select a dose option. This can be done one of two ways:

   a. Choose a pre-defined dose.

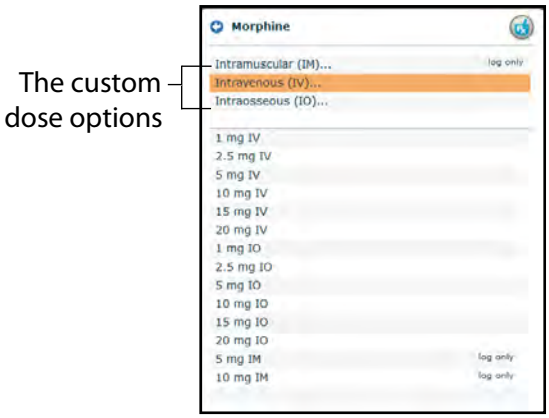


The Medication Dose Menu

   The dose is applied and appears in the patient's physiology.

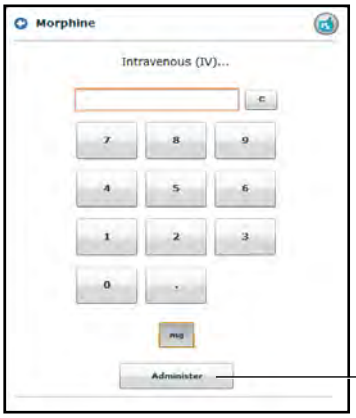
   OR,

   b. Choose a route of administration to administer a custom dose.



The Medication Dose Menu

The Custom Dose Administration menu appears.



The Custom Dose Administration Menu

5. Enter the desired dose and click the **Administer** button.

   The dose is applied and appears in the patient's physiology.

   NOTE: Not all medications affect the patient's physiology, but all are logged.

Using the Interventions Palette

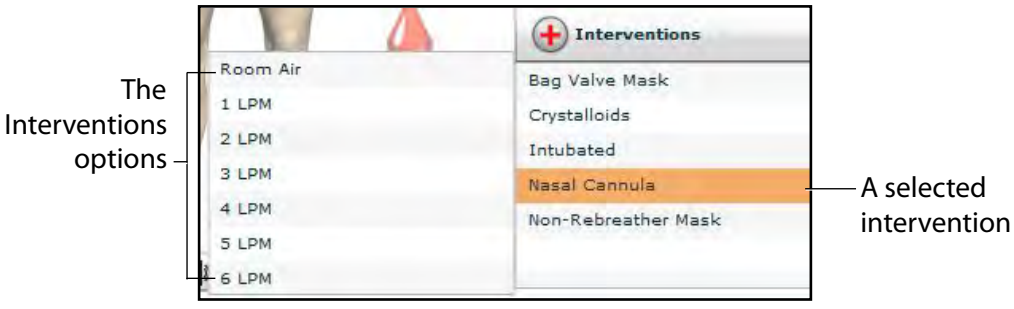
There are two ways to perform and/or administer interventions using the Interventions palette: using a Quick Link or using the complete **Interventions** menu. Quick Links are preconfigured interventions that are made accessible in the **Interventions** palette for quick application. Quick Links can also be created for the **Conditions** and **Medications** palettes.

To apply an intervention using the Quick Links in the **Intervention** palette, click an Intervention Quick Link.

NOTE: Not all interventions affect the patient's physiology, but all are logged.

The Interventions Palette

Once an Intervention is selected, a menu appears with available options for the selected Intervention. Click the desired option to select it. The intervention is applied and appears in the patient's physiology.



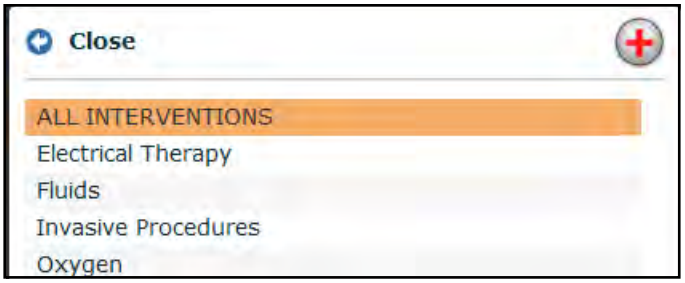
The Selected Intervention Options

NOTE: Quick Links can only be added while creating or editing the SCE.

Or, to apply an intervention that is not set up as a Quick Link in the **Interventions** palette:

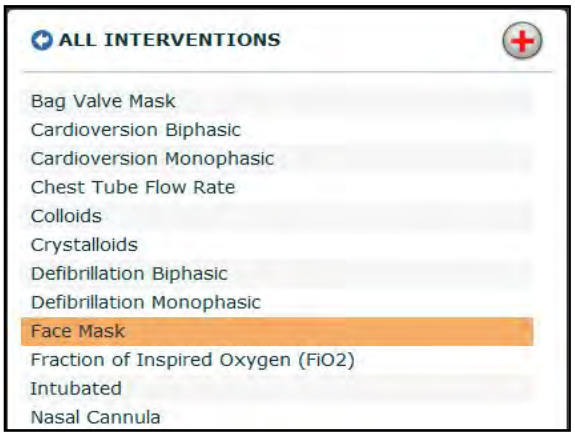
1. Click the **Interventions** button.

   The Interventions menu appears. Interventions are organized by type, or all available interventions are listed under **ALL INTERVENTIONS**.



The All Interventions Menu

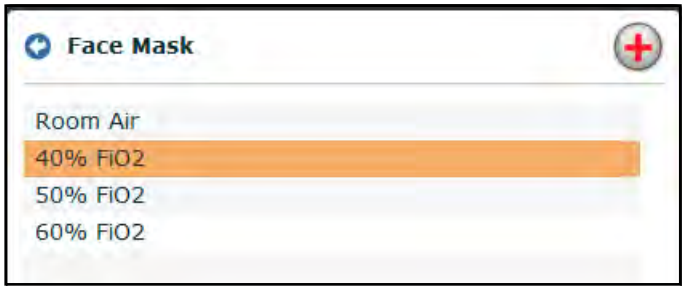
2. Navigate through the menus to find the desired intervention.
3. Once the desired intervention has been located, click the intervention's name from the list.



The All Interventions Menu

   The Intervention Options menu appears, showing the available options for the selected intervention.

4. Click the desired option.



The Intervention Options

The intervention is applied and appears in the patient's physiology.

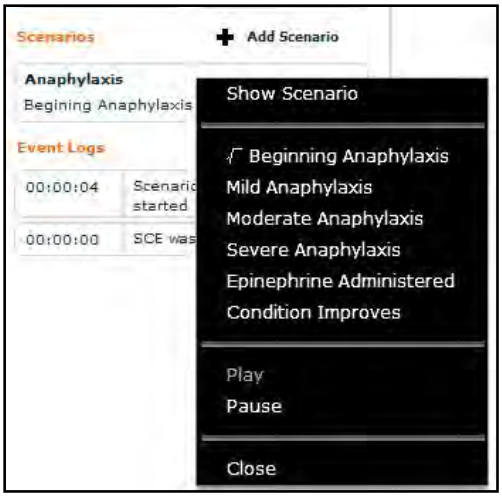
Transitioning Scenario States from the Run Screen

To move between scenario states from the Run screen:

1. Click the desired scenario.

A Scenario

The Scenario Management pop-up menu appears, and all available states are listed.



The Scenario Management Pop-Up Menu

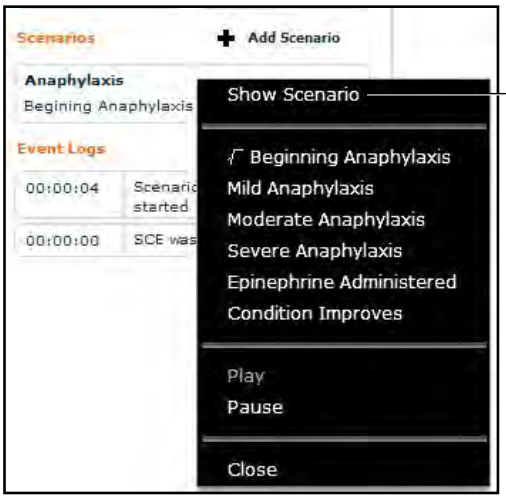
2. Select the desired state. The scenario proceeds to the selected state.

   The scenario can also be paused or continued by selecting the **Pause** and **Play** options from the Scenario Management Pop-Up menu.

Transitioning Scenario States from the Scenario Screen

To move between scenario states from the Scenario Screen:

1. From the Run screen, click the desired loaded scenario. The Scenario Management pop-up menu appears.



The Scenario Management Pop-Up Menu

2. From the menu, select **Show Scenario**.

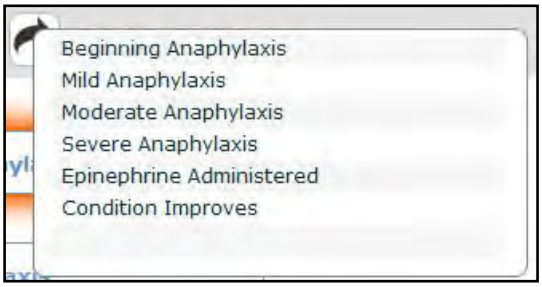
   The Scenario screen appears, displaying the scenario.

The Scenario Screen

At the top of this screen, the Scenario Time and State Time are visible. Additionally, users can pause and continue playing the scenario by clicking the **Pause** and **Play** buttons on the Scenario Management pop-up menu, which is still visible on the left side of the screen.

3. Click the **Jump to State** button.

   The Jump to State menu appears, displaying the available states.



The Jump to State Menu

4. Select the desired state.

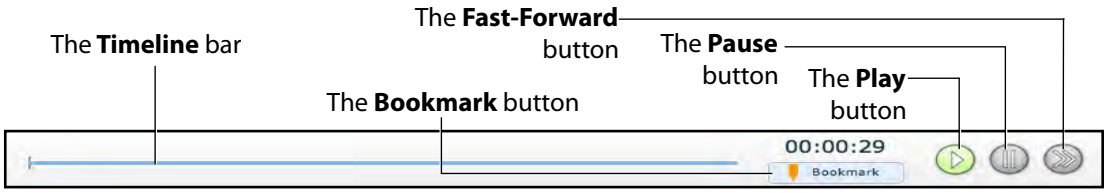
   The scenario transitions to the selected state and the state is highlighted on the Scenario screen.

   NOTE: Double-click on the states to expand to the full view.

5. Click the **Close Window** button to return to the Run screen.

SCE Time Controls

The SCE time controls are located at the top of the Run screen.



The SCE Time Controls

The **Timeline** bar shows the amount of time that has elapsed and bookmarks that have been created.

The **Bookmark** button creates a bookmark at the current point in the SCE. The bookmark can be used later to return to this point in the SCE, resetting the patient's physiology to what it was when the bookmark was created.

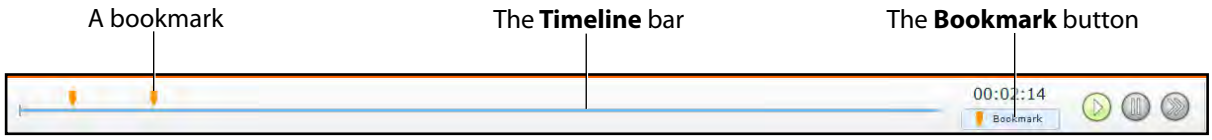
The **Play** button starts the SCE if it has been paused.

The **Pause** button pauses the SCE time.

The **Fast-Forward** button accelerates the SCE time at a 4:1 ratio.

Using Bookmarks

To create a bookmark, click the **Bookmark** button. An orange bookmark appears on the **Timeline** bar.

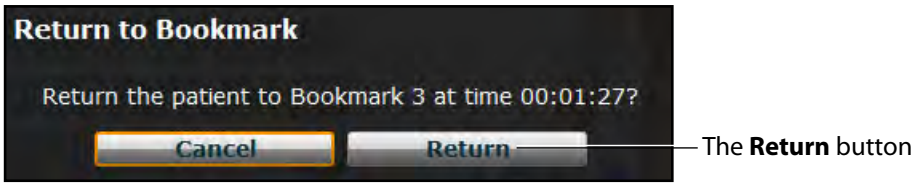


The SCE Time Controls

To return to a bookmarked time in the SCE:

1. Click the orange bookmark on the timeline.

   The Return to Bookmark message appears.



The Return to Bookmark Message

2. Click **Return**.

   The SCE returns the selected point in the timeline.

   NOTE: The SCE time continues moving forward and does not reset to the bookmarked time.

Using the Event Recorder to Save States

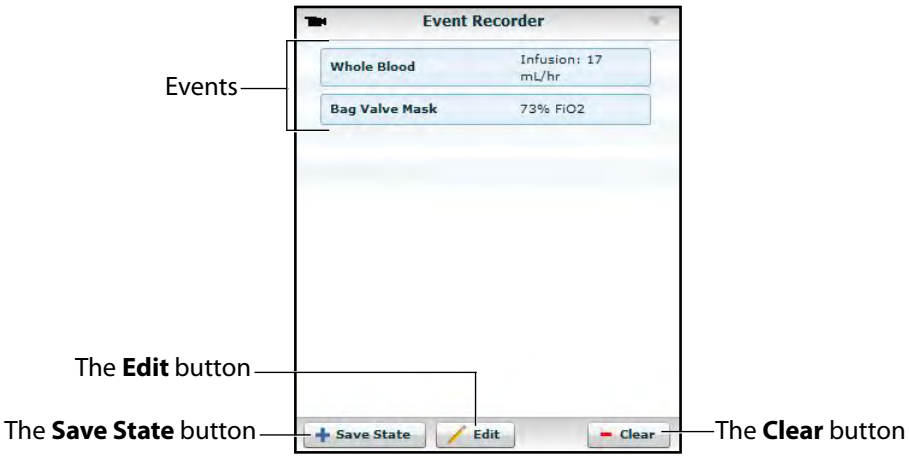
The Event Recorder can be used to save conditions, interventions and parameter changes as states.

To save a state using the Event Recorder:

1. Apply the desired conditions, interventions and parameters.
2. Click the **Event Recorder** button at the bottom of the Müse screen.

The Event Recorder Button

The Event Recorder appears, displaying all events that have occurred since the start of the SCE.



The Event Recorder

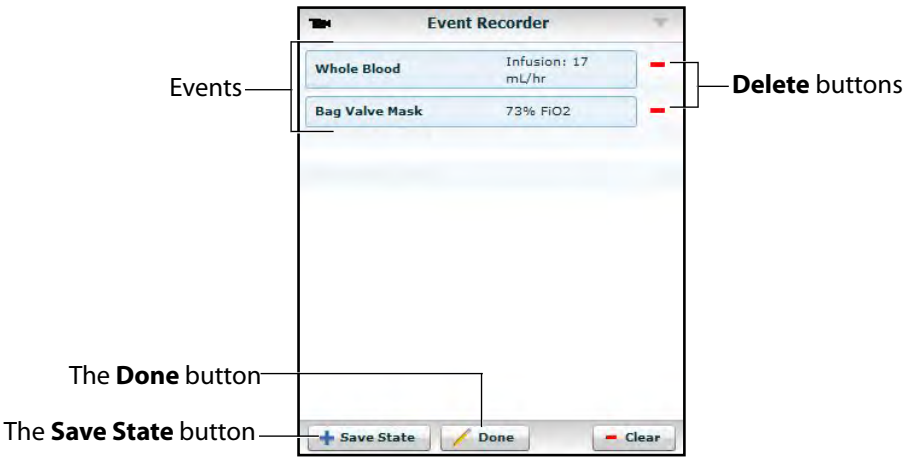
WARNING: The **Clear** button deletes all recorded events. This action cannot be undone.

3. Review the list of events.

   If you wish to remove any events from the state to be saved:

   a. Click **Edit**.

      A **Delete** button appears next to each recorded event.



The Event Recorder

   b. Click the **Delete** button next to each event to be removed.

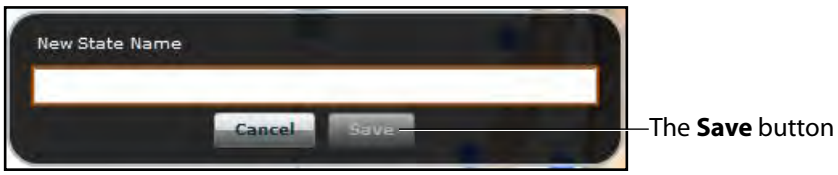
      The events are removed from the Event Recorder.

   c. Click **Done**.

      The **Delete** buttons are hidden.

4. Click **Save State**.

   The New State Name window appears.



The New State Name Window

5. Enter a state name.
6. Click **Save**.

The state is saved to the State Library and can be accessed via the Scenario Designer.

For more information about the State Library, see *Saving States to the State Library on page 126*.

Creating a New Patient

When an additional patient with specific physiological characteristics is needed for repeated use, a new patient can be created from the Run screen.

To create a new Patient:

1. From the Home page, run an SCE that has a Patient with the same gender as the Patient to be created.
2. From the Run screen, apply the desired conditions and set the necessary parameters.
3. Once complete, click the **Patient** button at the bottom of the Run screen.

The Patient Button

The Patient pop-up menu appears.

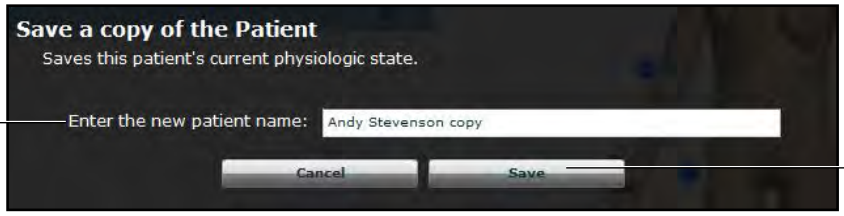
The **Save** button

The Patient Pop-Up Menu

4. Click **Save**.

   The Save a copy of the Patient dialog box appears.

The **Enter the new patient name** field



The **Save** button

The Save a Copy of the Patient Dialog Box

5. Enter a name for the new Patient in the **Enter the new patient name** field.
6. Click **Save**.

   The new Patient is saved and available for selection from the Base Patients Library when creating a new SCE.

Resetting a Patient

Resetting a Patient brings the Patient back to its original physiological state before any scenarios were applied or modifications were made. Any running scenarios are paused. However, the SCE time is unaffected. Additionally, the reset appears in the Event Logs.

NOTE: If baseline physiology settings have been selected, they are removed when the Patient is reset.

To reset a Patient:

1. While running an SCE, click **Patient** at the bottom of the Run screen.

The Patient Button

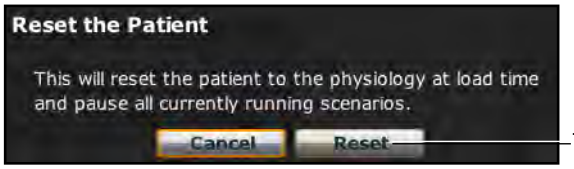
The Patient pop-up menu appears.

The **Reset** button

The Patient Pop-Up Menu

2. Click **Reset**.

The Reset the Patient dialog box appears, stating that the patient's physiology will be reset to its state at load time and all running scenarios will be paused.


Reset the Patient
This will reset the patient to the physiology at load time and pause all currently running scenarios.
Cancel
Reset

The **Reset** button

The Reset the Patient Dialog Box

3. Click **Reset**. The Patient returns to its original physiological state at the start of the SCE.
4. To resume any paused scenarios, click the loaded scenario on the left side of the screen.

   The Scenario Management pop-up menu appears.
5. From the Scenario Management pop-up menu, select **Play**.

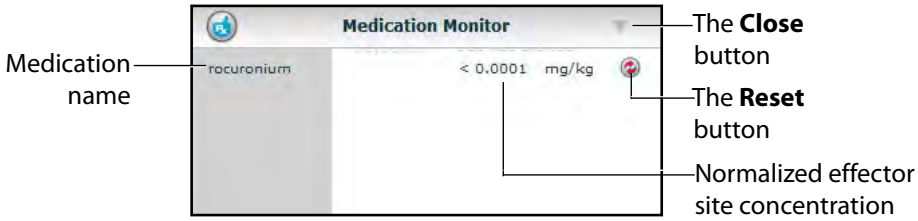
   The scenario is resumed.

The Medication Monitor

The Medication Monitor tracks the infusion of medication administered. To activate the Medication Monitor, from the Run screen, click the **Medication Monitor** button in the bottom, right portion of the screen.

The Medication Monitor Button

The Medication Monitor appears as a movable box on the Run screen.



The Medication Monitor

The normalized effector site concentration is shown next to each medication listing.

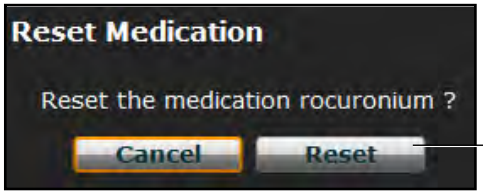
The **Reset** button is used to clear a medication from the physiological model and the Medication Monitor.

To close the Medication Monitor, press the **Close** button in the upper right corner of the medication Monitor window.

Resetting a Medication

To reset a medication from the Medication Monitor, click the **Reset** button on the Medication Monitor.

The Reset Medication dialog box appears, asking you to confirm that you wish to reset the medication.



The Reset Medication Dialog Box

The medication is cleared from the model and from the Medication Monitor.

With continuous infusions, the amount infused goes back to zero, but the infusion continues. To stop the infusion, you must select the medication from the medication library and set the infusion rate to zero.

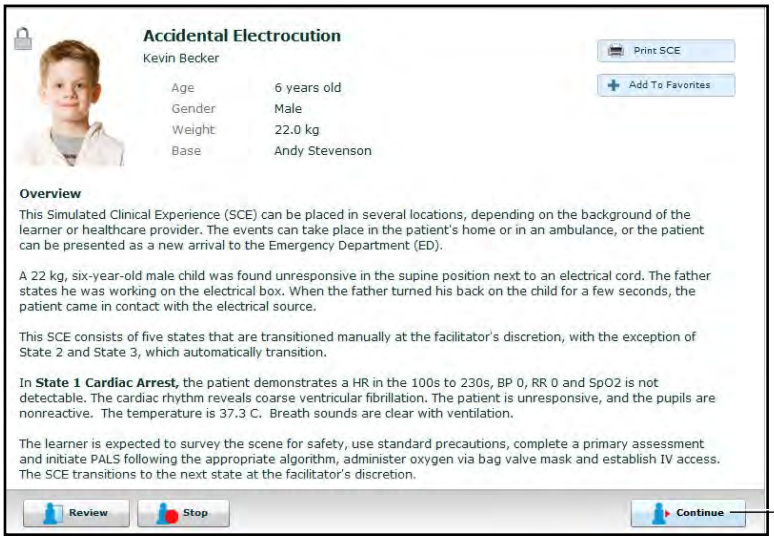
Returning to the Home Page

To exit the SCE and return to the Home page, click the **Return** button.

The Return Button

The SCE continues running and the Home page appears.

To return to the SCE from the Home page, click the **Continue** button in the SCE summary panel of the running SCE.


Accidental Electrocution
Kevin Becker
Print SCE
Add To Favorites
Age 6 years old
Gender Male
Weight 22.0 kg
Base Andy Stevenson
Overview
This Simulated Clinical Experience (SCE) can be placed in several locations, depending on the background of the learner or healthcare provider. The events can take place in the patient's home or in an ambulance, or the patient can be presented as a new arrival to the Emergency Department (ED).
A 22 kg, six-year-old male child was found unresponsive in the supine position next to an electrical cord. The father states he was working on the electrical box. When the father turned his back on the child for a few seconds, the patient came in contact with the electrical source.
This SCE consists of five states that are transitioned manually at the facilitator's discretion, with the exception of State 2 and State 3, which automatically transition.
In State 1 Cardiac Arrest, the patient demonstrates a HR in the 100s to 230s, BP 0, RR 0 and SpO2 is not detectable. The cardiac rhythm reveals coarse ventricular fibrillation. The patient is unresponsive, and the pupils are nonreactive. The temperature is 37.3 C. Breath sounds are clear with ventilation.
The learner is expected to survey the scene for safety, use standard precautions, complete a primary assessment and initiate PALS following the appropriate algorithm, administer oxygen via bag valve mask and establish IV access. The SCE transitions to the next state at the facilitator's discretion.
Review
Stop
Continue
The Continue button

The SCE Summary Panel

Stopping the SCE

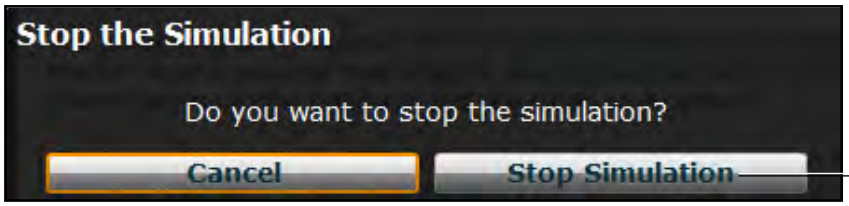
Running SCEs can be stopped from the Run screen or the Home page.

To stop an SCE from the Run screen:

1. Click **Stop** in the upper right corner of the screen.

The Stop Button

The Stop the Simulation dialog box appears.



The **Stop Simulation** button

The Stop The Simulation Dialog Box

2. Click **Stop Simulation**.

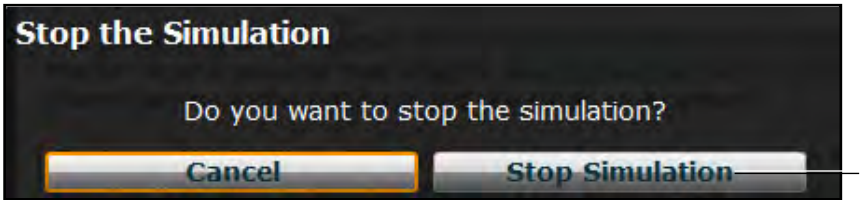
   The SCE stops running and the Müse Home page is shown.

To stop an SCE from the Home page:

1. Click the **Stop** button in the bottom left corner of the SCE Summary Panel.

The Stop Button

The Stop the Simulation dialog box appears.



The **Stop Simulation** button

The Stop The Simulation Dialog Box

2. Click **Stop Simulation**.

   The SCE stops running.

IMPORTANT: Always stop all running SCEs before logging out of Müse.

Developing SCEs

Creating and editing SCEs are similar processes. Once an SCE is created, the steps for modifying the SCE are the same as those for editing a previously-created SCE. The processes of creating and editing SCEs each begin with a unique button on the Home screen.

Use the **New SCE** button to create a new SCE.

The New SCE Button

The minimal requirements for creating a new SCE include selecting a Patient, naming the SCE and saving the SCE. Once the new SCE is created, you can continue with the SCE development or edit it later.

Use the **Review** button to edit an existing SCE.

The Review Button

Creating a New SCE

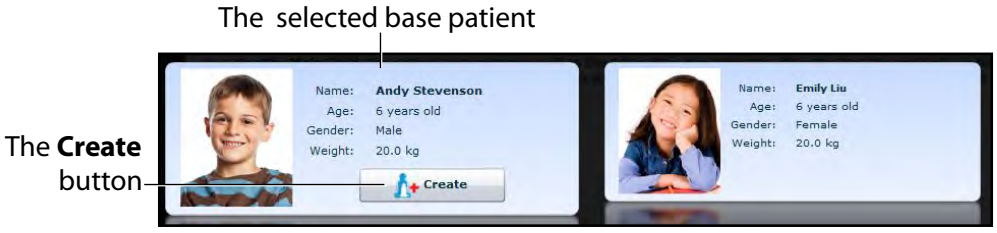
Creating an SCE requires naming the SCE and selecting a Base Patient.

To create a new SCE:

1. From the Home screen, click **New SCE**.

The New SCE Button

The Patients Palette appears.



The Patients Palette

2. Select a patient from the palette and click **Create**.

   The SCE Editor appears, showing the Enter a name for the SCE dialog box.

The SCE Editor Screen

3. Enter the name for the SCE.

   NOTE: The name of the SCE may NOT exceed 80 characters. Additionally, SCE file names CANNOT contain any special characters, such as / \ : * ? < > % | “

4. Click **Save**.

   Once the SCE is saved, it is stored and can be edited and reviewed at any time, including creating a Patient Profile and content, determining settings and programming scenarios.

The SCE Editor

The SCE Editor can be used to review preconfigured SCEs and to create or edit custom SCEs.

To access the SCE Editor, click the **Review** button in the SCE Summary Panel or create a new SCE.

The SCE Editor

The buttons in the upper right corner of the SCE Editor provide options for running the SCE, generating a printable PDF of the SCE or returning to the Home page.

The **Content Management**, **SCE Configuration** and **Preloaded Scenario** links in the left panel are used to review the SCE content and configuration and to view scenarios applied to the SCE.

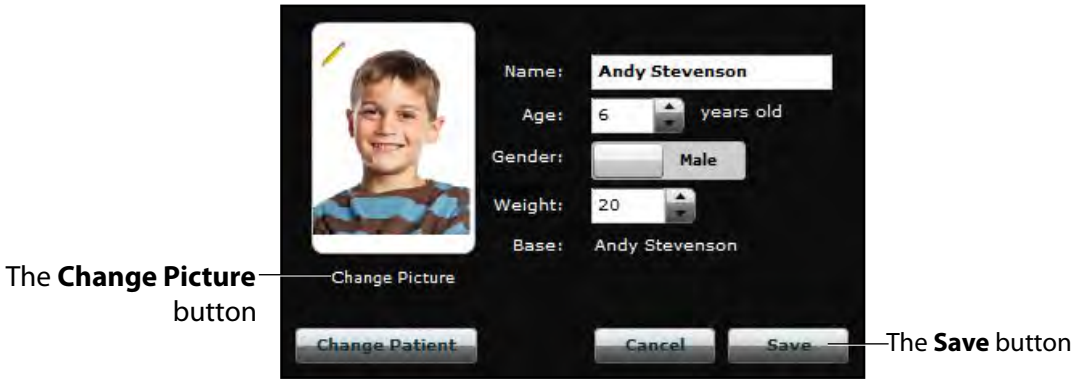
Editing a Patient's Profile

To edit the Patient Profile:

1. From the SCE Editor, in the **Profile** section, click **Edit**.

The SCE Editor Screen

The Profile Editor appears.



The Profile Editor

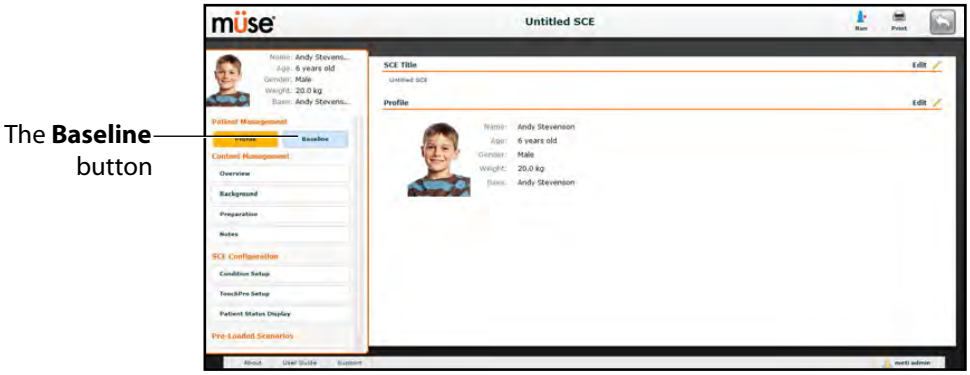
2. Set the Patient's name, age, gender and weight by filling in the appropriate fields.
3. Click the **Change Picture** button to change the patient's picture (optional).
4. Click **Save**.

   IMPORTANT: No part of the patient's profile can contain any special characters, such as / \ : * ? < > % | "

Setting a Patient's Baseline

To set the Patient's Baseline:

1. From the SCE Editor, click **Baseline**.



The SCE Editor Screen

The Patient Baseline screen appears.

The Patient Baseline Screen

2. Set the Patient's baseline physiology by modifying the desired parameters.
3. Click **Complete**.

   When the SCE begins, the Patient presents with the selected baseline settings.

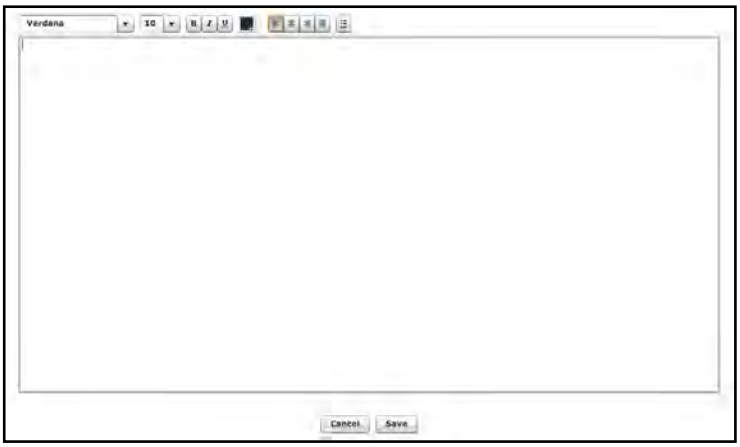
Content Management

SCE Content is entered from the SCE Editor using the **Overview**, **Background**, **Preparation** and **Notes** buttons under the **Content Management** heading.

The Content Management Buttons

Each button accesses a screen that allows users to enter information for the chosen section (Overview, Background, Preparation or Notes). Click the **Edit** button of each section on the SCE Editor to access a rich-text editor that enables data entry.

IMPORTANT: Text can be copied and pasted into the fields from TextEdit or Notepad only.



The Rich-Text Editor

Click **Save** when all data for the field has been entered.

SCE Configuration

Setting up the Conditions, the TouchPro software and the Patient Status Display is achieved by clicking the buttons under the **SCE Configuration** heading in the SCE Editor.

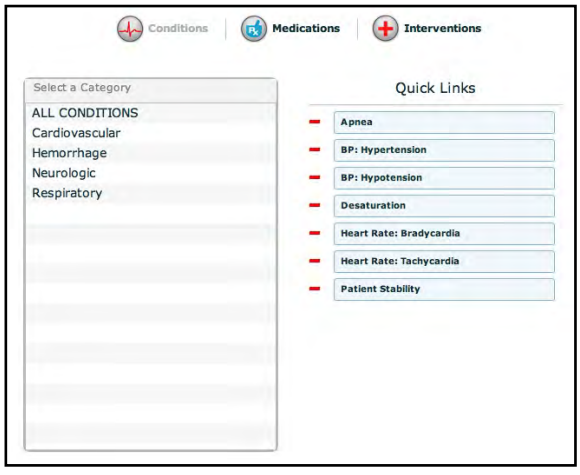
The SCE Configuration Buttons

Condition Setup Screen and Creating Quick Links

Click **Condition Setup** to access the Condition Setup screen. From the Condition Setup screen, conditions, medications and interventions can be preconfigured for the SCE creating Quick Links.

On the Condition Setup screen, **Conditions**, **Medications** and **Interventions** buttons are available. To navigate through available conditions and interventions, click the **Conditions, Medications** and **Interventions** buttons.

The Conditions Setup screen appears.



The Condition Setup Screen

To create a Quick Link, drag and drop the desired choice(s) from the Conditions, Medications or Interventions palette to the list of Quick Links.

Click the minus sign to remove a Quick Link from the SCE.

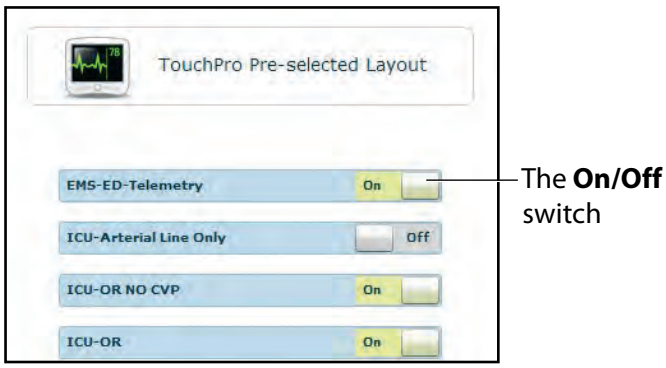
Modifying the TouchPro Setup

Use the **TouchPro Setup** link to access the TouchPro Setup panel.

From the TouchPro Setup panel, TouchPro layouts can be enabled or disabled for the selected SCE.

When a layout is enabled, it is available to be used in the TouchPro software with the selected SCE. When a layout is disabled, it is unavailable to be used in the TouchPro software with this SCE.

Click the **On/Off** switch next to a layout to enable or disable it.



The TouchPro Setup Panel

Patient Status Display

To configure the Patient Status Display displayed on the Run screen, click **Patient Status Display** under the SCE Configuration heading on the SCE Editor.

The Patient Status Display screen appears.

The Patient Status Display Screen

To modify the Patient Status Display, drag and drop the desired waveform, numeric or volume widgets from the Available Widgets panel to an available Patient Status Display space.

NOTE: Waveforms occupy two spaces.

Once the desired widget is placed, click the widget to change the physiologic parameter displayed.

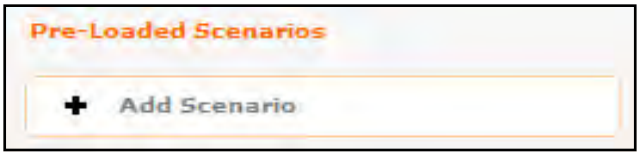
Adding a Scenario from the SCE Editor

SCEs incorporate scenarios that contain preprogrammed physiology. Scenarios can be added to SCEs to enhance patient physiology. When a scenario is added to an SCE from the SCE Editor, the scenario becomes associated with the SCE and begins automatically when the SCE is run.

Click the **Add Scenario** button on the Run screen to add a scenario to an SCE that is running.

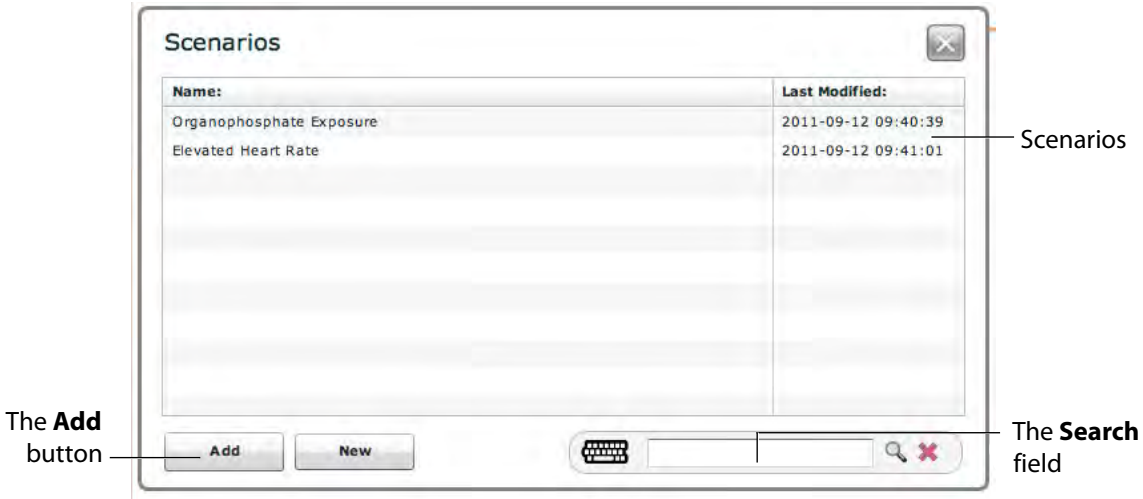
To add a scenario to an SCE from the SCE Editor:

1. Click the **Add Scenario** button under the Preloaded Scenarios heading.



The Add Scenario Button

The Choose Scenario dialog box appears.



The Choose Scenario Dialog Box

2. Select a saved scenario from the Choose Scenario Dialog Box.

   The **Search** field can be used to search for a scenario to select.

3. Click **Add**.

   The scenario is added to the SCE and is listed on the SCE Editor beneath the Pre-Loaded Scenarios heading.

For information about editing scenarios, see *Editing a Scenario on page 111*.

Developing Scenarios

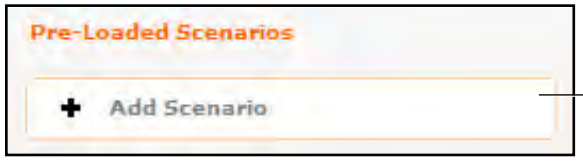
The Scenario Designer allows users to create and edit scenarios.

To access the Scenario Designer, create a new scenario or choose an existing scenario to edit.

Creating a New Scenario

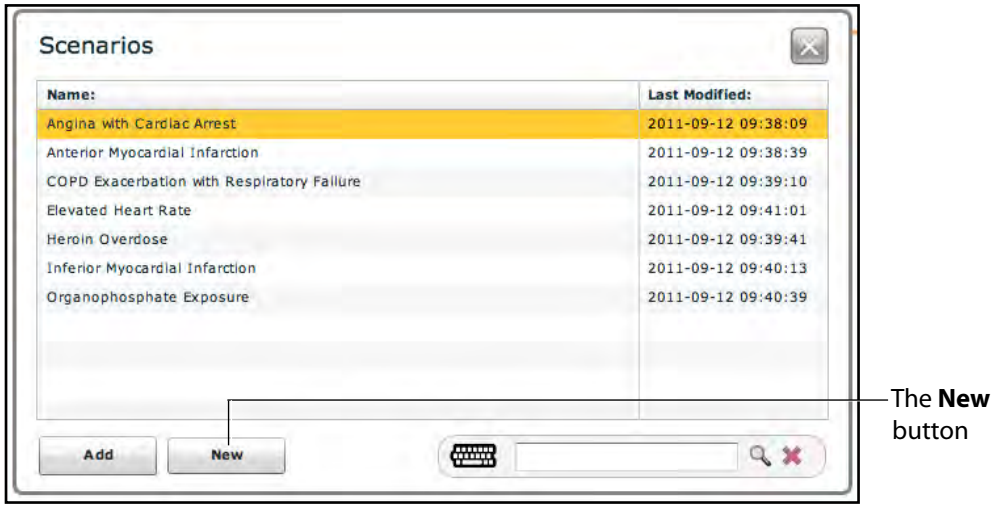
To create a new scenario:

1. From the SCE Editor, under the Pre-Loaded Scenarios heading, click the **Add Scenario** button.



The Pre-Loaded Scenarios Heading

The Choose Scenario dialog box appears.



The Choose Scenario Dialog Box

2. Click **New**.

   The Scenario Designer appears, displaying the new, untitled scenario.

The Scenario Designer

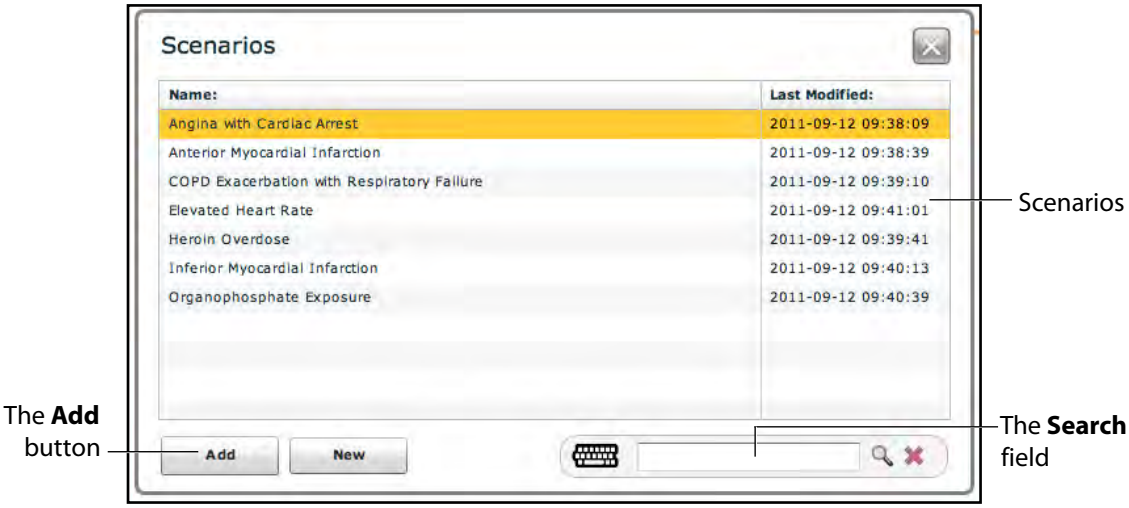
Editing a Scenario

To edit a scenario:

1. From the SCE Editor, under the Pre-Loaded Scenarios heading, click the **Add Scenario** button.

The Pre-Loaded Scenarios Heading

The Choose Scenario dialog box appears.



The Choose Scenario Dialog Box

2. Select a saved scenario from the Choose Scenario Dialog Box.

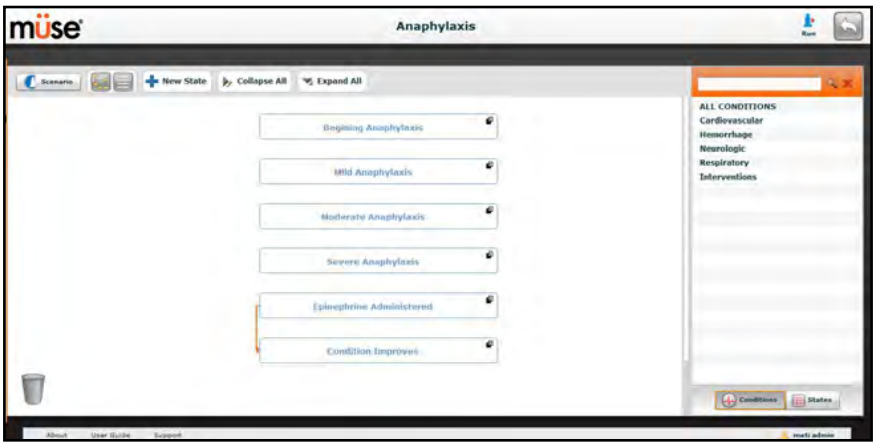
   The **Search** field can be used to search for a scenario to select.

3. Click **Add**.

   The scenario is added to the SCE and is listed on the SCE Editor beneath the Pre-Loaded Scenarios heading.

4. Click the scenario's name under the Pre-Loaded Scenarios heading.

   The Scenario Designer appears, displaying the selected scenario.

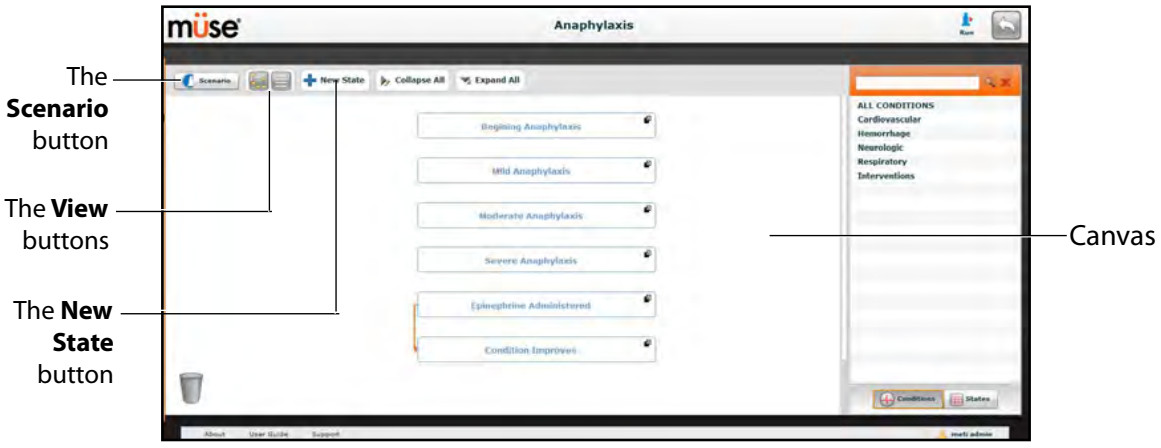


The Scenario Designer

The Scenario Designer

The Scenario Designer is accessed by creating or editing a scenario from the SCE Editor.

From the Scenario Designer, scenario states can be added, modified and deleted.



The Scenario Designer

The **Scenario** button is used to manage states and save the scenario.

The **View** buttons toggle between Scenario Designer views.

The **New State** button is used to add new states.

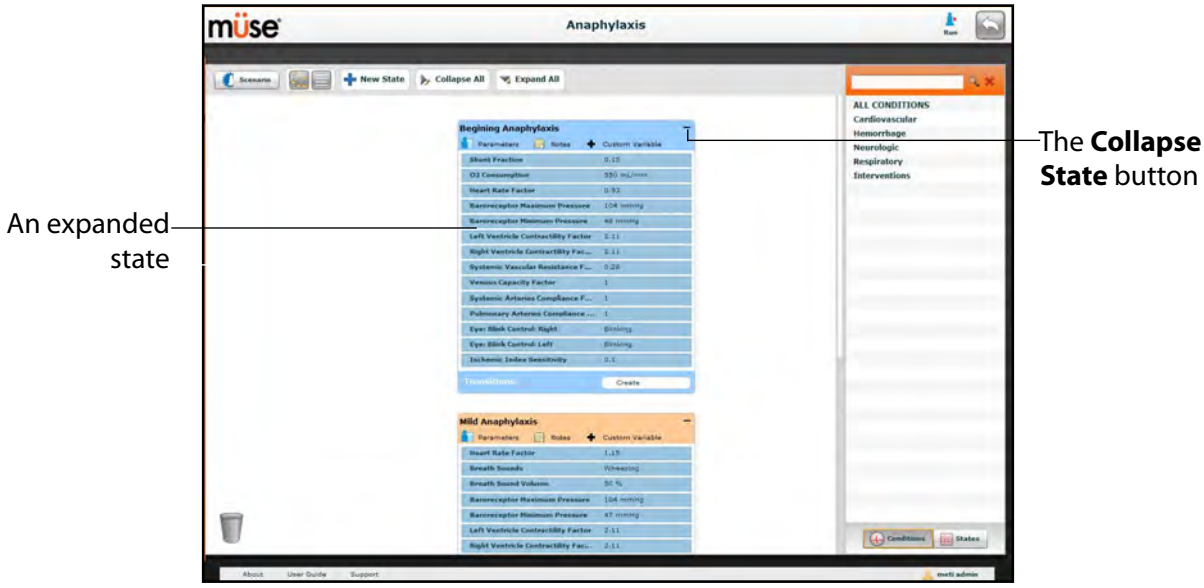
Once created, states are displayed on the Scenario Designer canvas.

Scenario Designer Views

The Scenario Designer has two views: the Graphical view and the Line Item view. The Graphical view allows users to map out scenario states. The Line Item view places the states and transitions into a linear format.

The Scenario Designer View Buttons

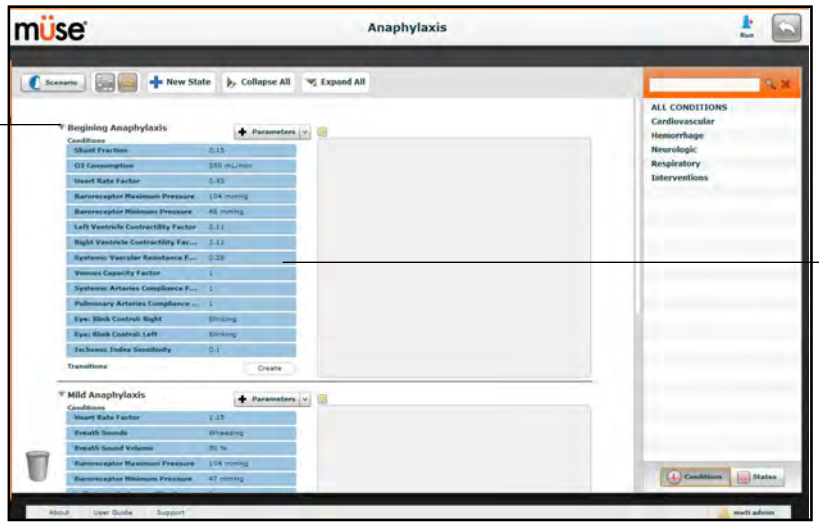
Click the **Graphical view** button to utilize the Graphical View.



The Graphical View

From the Graphical View, double-click on any state to expand it and view all its components. Click the **Collapse State** button to collapse an expanded state.

Click the **Line Item view** button to utilize the Line Item view.

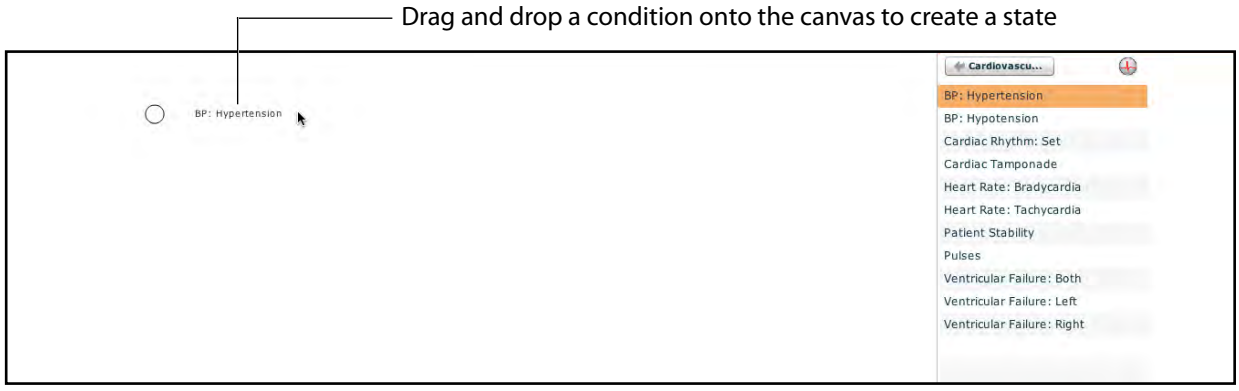


The Line Item View

From the Line Item View, click the **Expand/Contract** arrow to the left of any state to expand it and view all its components. Click the arrow again to collapse the state.

Adding Scenario States

When beginning to create a new scenario, the canvas is blank. Scenario states can be created by dragging and dropping conditions, medications and interventions from their respective menus on the right side of the Scenario Designer to the canvas.



The Scenario Designer Canvas

Or, a new, empty state can be added using the **New State** button.

To add a new state using the **New State** button:

1. Click the **New State** button on the upper left side of the Scenario Designer.

The New State Button

A new state appears.

A New State

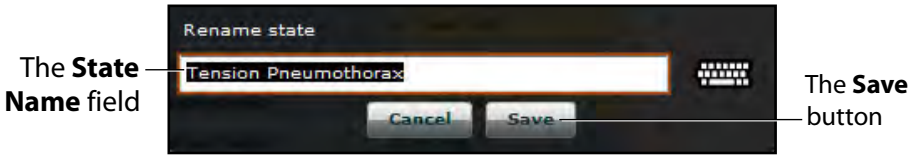
2. From the Graphical View, double-click the new state, or from the Line Item View, click the **Expand/Collapse** arrow to the left of the state to expand it.

   The state expands and additional options appear.

The Expanded State

3. Double-click the state name. (By default, new states are named "State.")

   The Rename state window appears and contains a field for entering a new state name.



The Rename State Window

4. Enter a new state name.

   NOTE: When naming a Scenario State, the state name may NOT exceed 127 characters Additionally, scenario file and state names CANNOT contain any special characters, such as (/ \ : * ? < > % | ")

5. Click **Save**.

   The state is renamed.

Modifying Scenario States

Once a scenario state has been placed on the canvas, it can be modified. Additional parameters, transitions and notes can be added. Each state can contain multiple parameters and transitions. Double-click the state name to rename it.

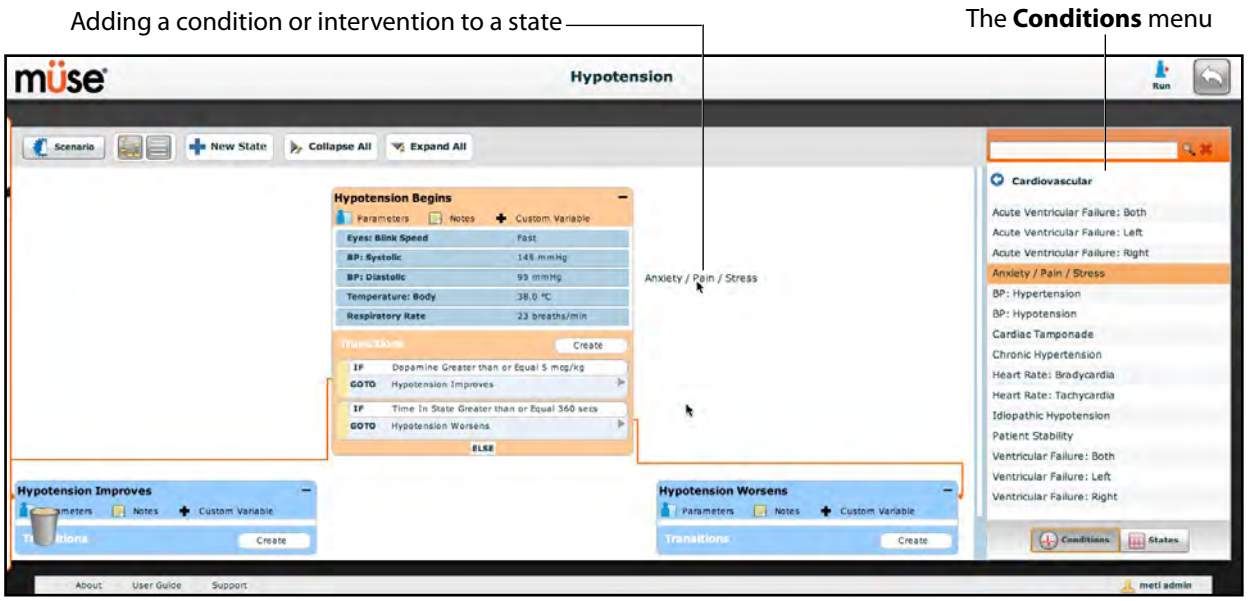
A State

Click the **Collapse State** button to minimize the state.

Double-click the collapsed state to expand it.

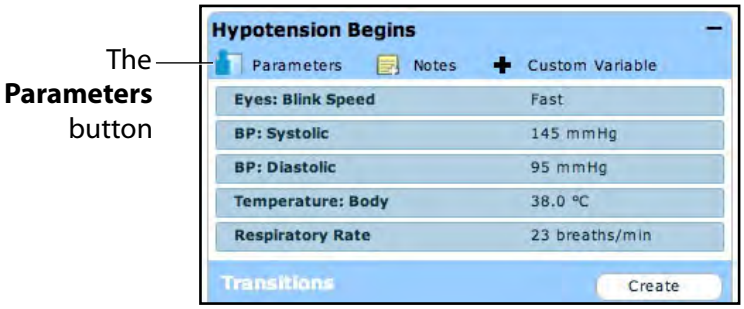
Adding Conditions, Interventions and Parameters

Conditions and interventions can be added to states by dragging and dropping them from the **Conditions** menu to the desired state.



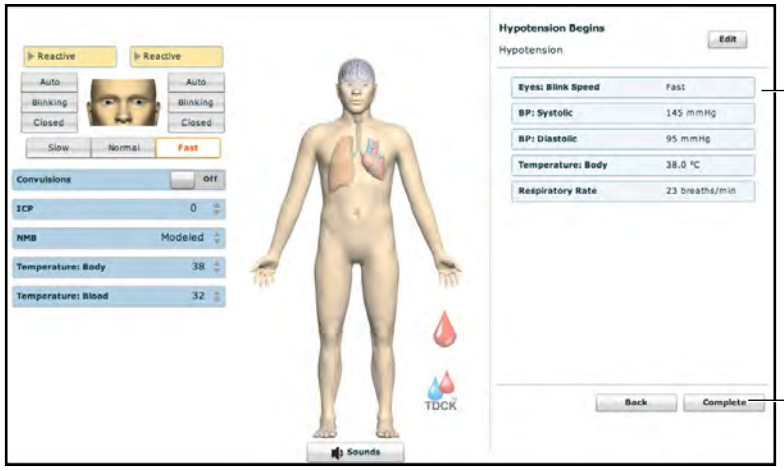
The Scenario Designer

To add parameters to a state, click the **Parameters** button within the state.



A State

The State Parameters screen appears.



The State Parameters Screen

Click the various organs to change the views, and then select the desired parameter. Once a parameter has been selected, it appears in the State Parameters panel on the right side of the screen.

Add as many parameters as needed. Added parameters appear consecutively within the state. Drag and drop to reorder as needed. Click **Complete** to save and exit the State Parameters screen, or click **Back** to exit without saving.

NOTE: If the physiology of any of the parameters conflicts, the Müse software reflects the physiology of the last parameter entered.

Adding Transitions

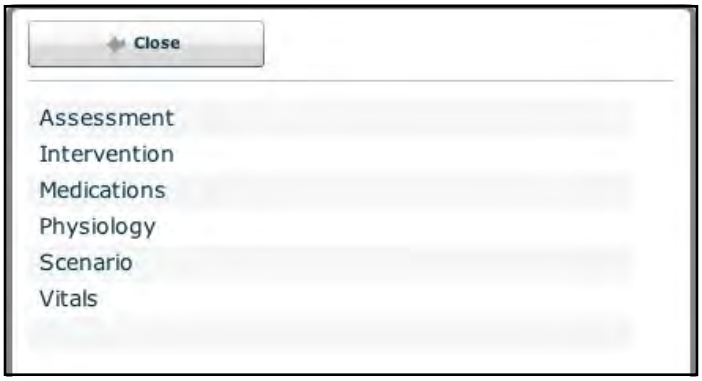
To add a transition, the scenario must have both an original state and a state that results from the transition.

To add a transition:

1. Click the **Create** button in the original state.

A State

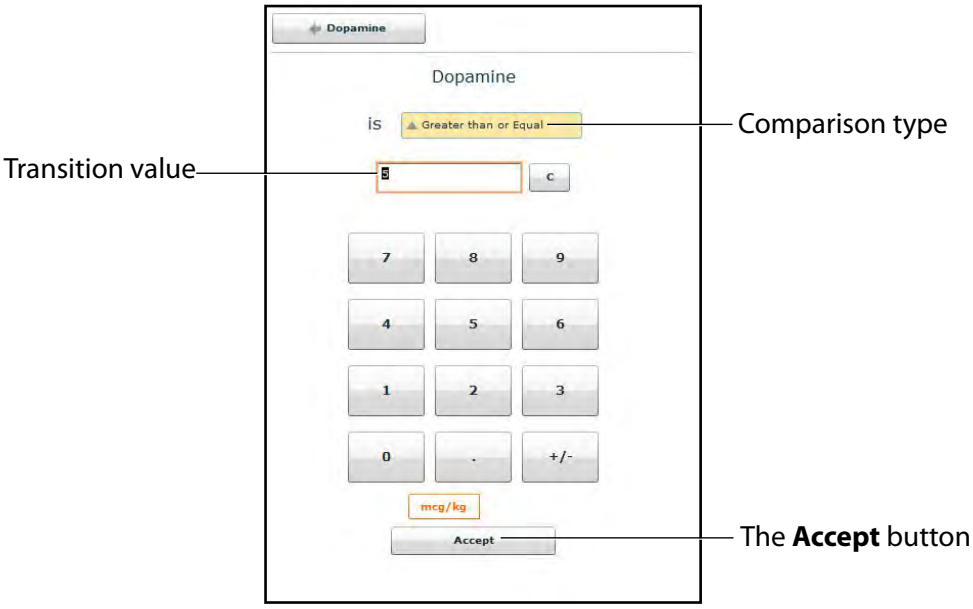
The Transitions Menu appears, listing all available transition variable types.



The Transitions Menu

2. Select the desired variable type. For example, if a transition based on the administration of medication is desired, select **Medications** and then select the desired medication from the list.

Once a medication is selected, The Medication Transition menu appears, asking for the comparison type and transition value.



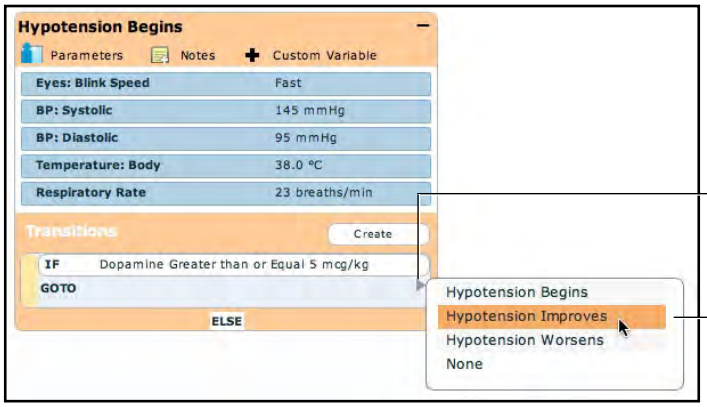
The Medication Transition Menu

Follow the same steps to make selections from similar menus for the **Assessment**, **Intervention**, **Physiology**, **Scenario** and **Vitals** variable types.

3. Once the variable values (e.g., comparison type and transition value) have been selected, click **Accept**.

   The selected transition variable is listed beneath the original state on the Scenario Designer.

4. From the Scenario Designer, click the **GOTO** arrow beneath the new transition variable.

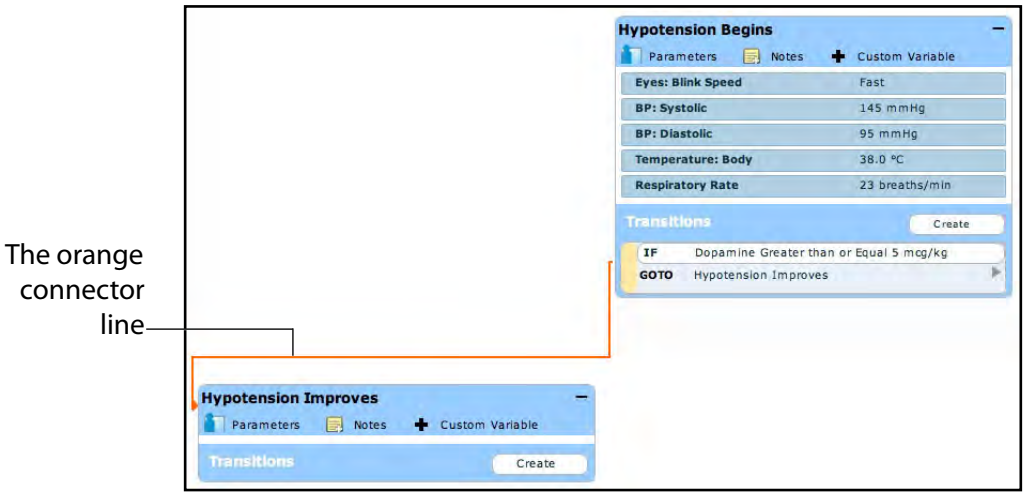


The Scenario Designer

The Available States menu appears, listing all the available states.

5. Select a state from the menu.

An orange connector line appears, indicating that the states are now linked by a transition.



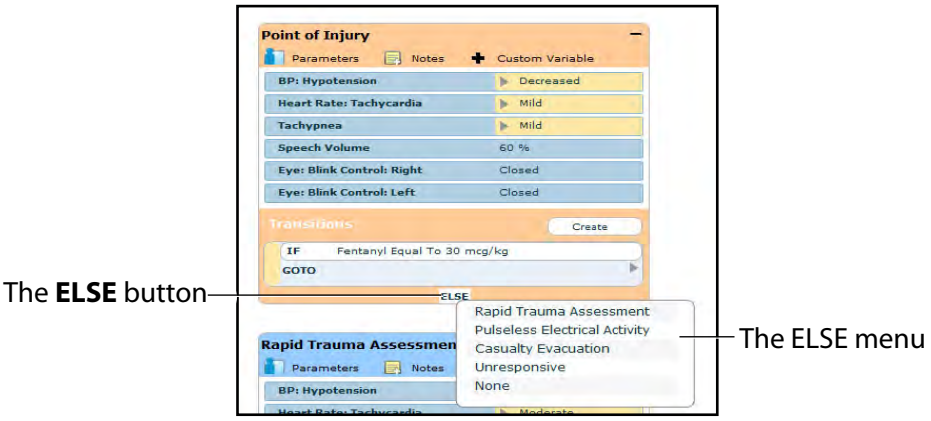
The Scenario Designer

ELSE Transitions

An ELSE transition is used to transition to a state automatically when none of the other programmed transitions occur.

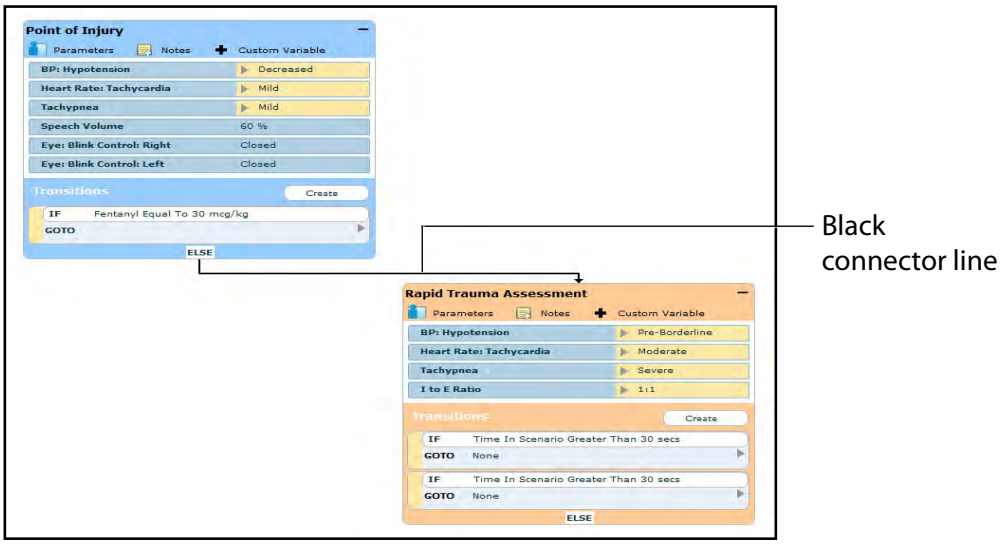
Before specifying an ELSE transition from a state, the state must first contain at least one other transition.

To add an ELSE transition, click **ELSE** in the original state. The ELSE menu appears, listing all the available states.



The Scenario Designer

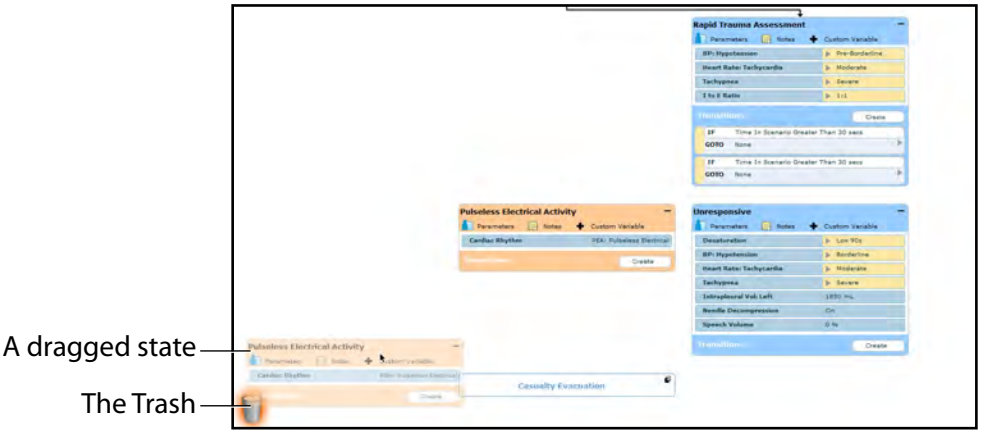
Select the desired state. A black connector line appears, indicating that the states are now linked by an ELSE transition.



The Scenario Designer

Deleting Scenario States

To delete a state, drag and drop the state into the Trash.



The Scenario Designer

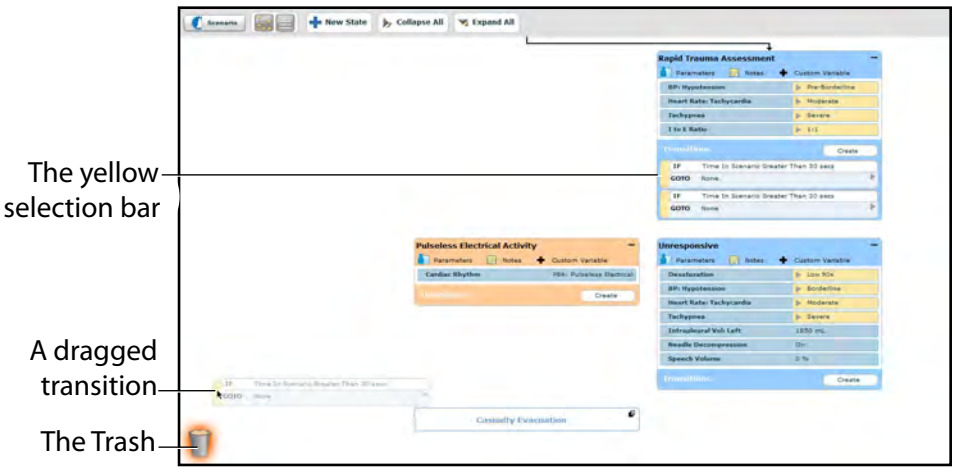
States can be dragged and dropped to the Trash from the Graphical view or the Line Item view.

Deleted states remain in the Trash until you log out of the software or the Trash is cleared.

Deleting Parameters and Transitions

To delete a parameter or transition, from an active state, drag and drop the desired parameter or transition into the Trash.

To drag a parameter, click anywhere within the parameter. To drag a transition, click the yellow selection bar to the left of the transition.



The Scenario Designer

Parameters and transitions can be dragged and dropped to the Trash from the Graphical view or the Line Item view.

Deleted parameters and transitions remain in the Trash until you log out of the software or the Trash is emptied.

Saving the Scenario

At any time during scenario creation or modification, the scenario can be saved.

To save a scenario:

1. Click the **Scenario** button in the upper left of the Scenario Designer.

   The Scenario drop-down menu appears.

The Scenario Drop-Down Menu

2. To save the most recent version of a modified scenario, click **Save**,

   OR

   To save a modified scenario as a new scenario, leaving the original scenario intact:

   a. Click **Save As**.

      When **Save As** is clicked, the Save Scenario dialog box appears.

The Save Scenario Dialog Box

   b. Enter the name for the scenario in the **Enter scenario name** field.

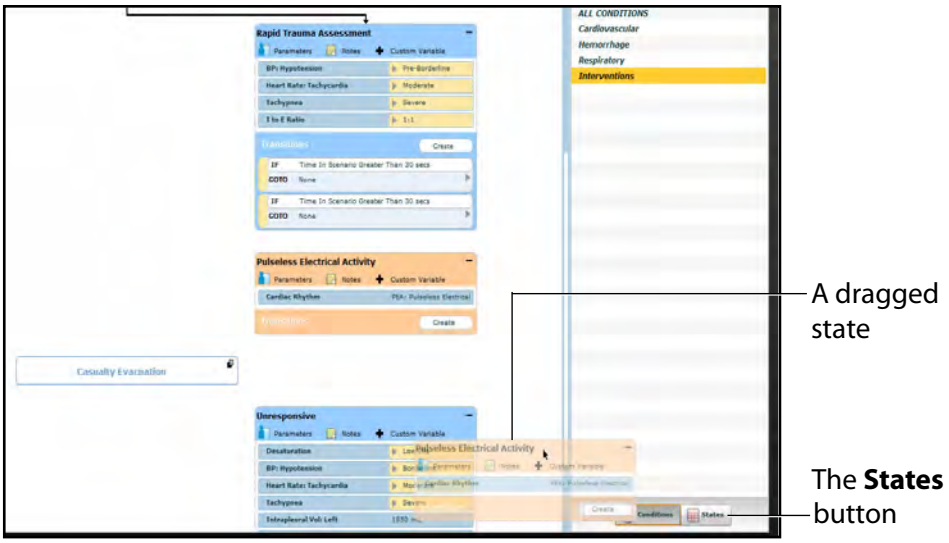
   c. Click **Save**.

NOTE: When naming a scenario, the scenario name CANNOT exceed 128 characters. Additionally, scenario file names CANNOT contain any special characters, such as / \ : * ? < > % |"

Saving States to the State Library

Users can save states to the State Library for later use.

To save a state, drag and drop the state to the **States** button.



The Scenario Designer

The state is stored in the library.

To access the State Library, click the **States** button in the bottom right corner of the Scenario Designer.

The States Button

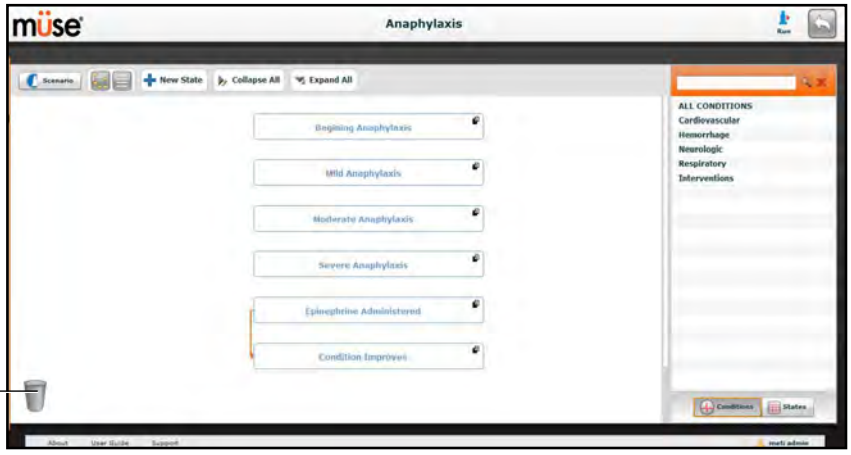
The State Library appears, listing all saved states.

The State Library

Click **Conditions** to exit the State Library.

Emptying the Trash

To empty the Trash, click the **Trash** icon in the lower left corner of the Scenario Designer.



The Scenario Designer

The Trash List appears.

The Trash List

Click **Empty Trash** to empty the Trash. If you do not wish to delete the items listed, they can be dragged back into the scenario, at which time they are removed from the Trash.

Logging out of the software automatically empties the Trash.

IMPORTANT: Items emptied from the Trash cannot be retrieved.

Administrative Tools

The Müse software has administrative tools that allow users to manage logs, stored content, users and system settings. The administrative tools are accessed via the Administrative Tools buttons, located on the Home page.

The Administrative Tools Buttons

Click the **History** button to view and manage simulation session logs.

Click the **System Administration** button to manage stored content, user accounts, groups and system settings.

Click the **Account Profile** button to manage and determine preferences for the active account.

History

From the History screen, users can view and export simulation session logs. Each simulation session is listed with the Start Time, the title of the SCE and the Patient's name. In addition, the Physiological Data and Simulation Events are available for review and export.

Start Time	SCE	Patient	Simulation Events	Physiological Data	Clear All Logs
2013-06-06 11:22:10	Healthy Male Child	Andy Stevenson	Simulation Events	Physiological Data	Clear
2013-06-06 11:20:09	Accidental Electrocution	Kevin Becker	Simulation Events	Physiological Data	Clear
2013-06-06 10:51:59	Diabetic Ketoacidosis with Hypoxemia	Natalie Rosa	Simulation Events	Physiological Data	Clear

The History Screen

By clicking the **Simulation Events** link of a Simulation Session, users can view the entire log of the simulation and all the events that occurred during the SCE.

When the **Physiological Data** link of a Simulation Session is clicked, users can view all the physiological data that occurred during the SCE.

On both the Simulation Events and Physiological Data screens, there is an **Export** button that, when clicked, exports the data to a CSV file that can be stored on an external device.

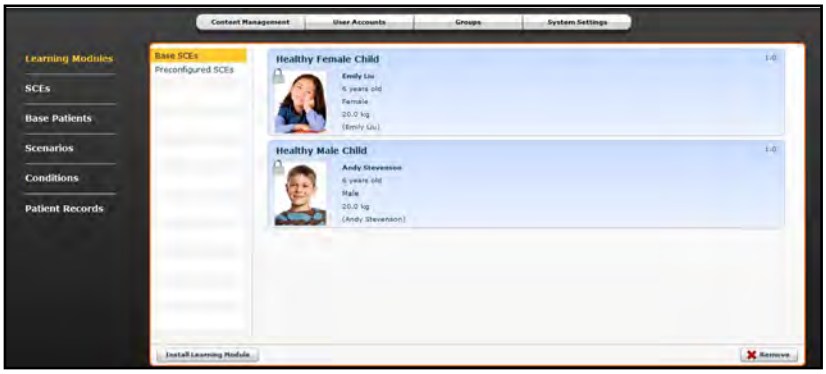
System Administration

From the System Administration screen, users can control and access Content Management, User Accounts, Groups, Maintenance and System Settings.

To access the System Administration screen, click the **System Administration** button from the Home page.

The System Administration Button

The System Administration screen is displayed.



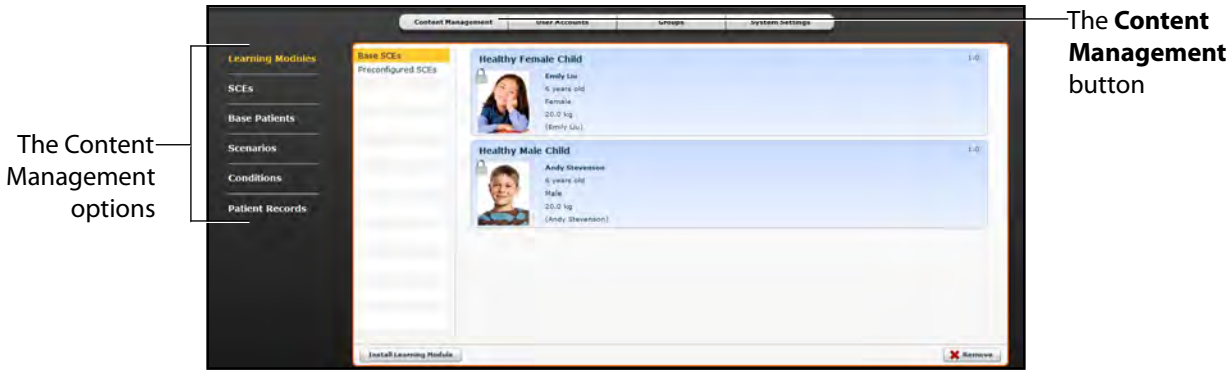
The System Administration Screen

Content Management

From the Content Management options, users can manage learning applications, SCEs, Base Patients and Scenarios.

To access the Content Management options, from the System Administration screen, click **Content Management**.

The Content Management options appear.



The System Administration Screen

Learning Modules

From the Learning Modules panel, learning applications can be installed or deleted.

When the Content Management button is selected, the Learning Modules panel appears by default. If another panel has been selected, return to the Learning Modules panel by clicking the **Learning Modules** link.

The Learning Modules Panel

To install a learning application:

1. Click **Install Learning Module**.

   The Select file to upload dialog box appears.

2. Locate the correct learning application file on the external storage device or the hard drive location where the SCE file is saved. The file extension is **mlm**.

3. Select the file and click **Select** or **Open**.

4. Refresh the screen by clicking the **Home** button in the Müse software and then return to the Learning Modules panel.

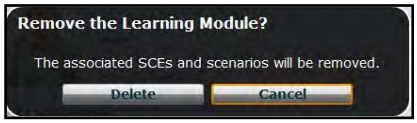
   The learning application appears on the Learning Modules panel and is available for use.

To delete a learning application from Müse:

1. Select a learning application from the Learning Applications panel.

2. Click the **Remove** button.

   The Remove Learning Module warning appears.



The Remove Learning Module Warning

3. Click **Delete**.

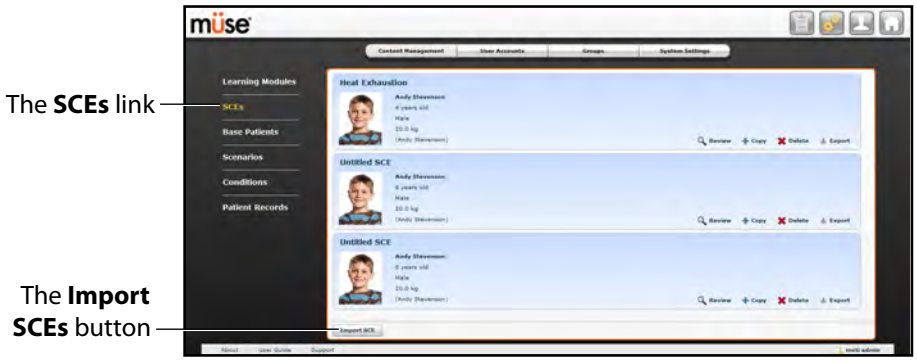
   The learning application and all its SCEs are deleted.

   NOTE: Preconfigured learning applications cannot be deleted. If a user attempts to delete them, a failure message appears.

SCEs

From the Content Management options, click **SCEs** to access the SCEs panel.

The SCEs panel appears.



The SCEs Panel

All user-created SCEs are listed in the SCEs panel.

On the SCEs panel, users can review, copy, delete, import and export the SCEs they have created.

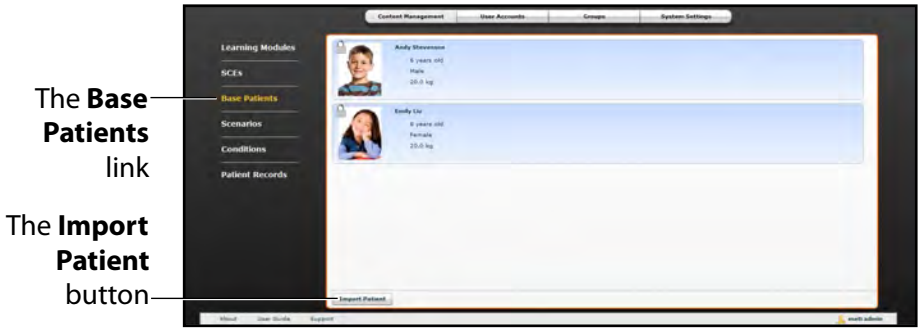
NOTE: SCEs purchased from CAE Healthcare CANNOT be exported.

Click **Import SCE** to import an SCE from an external device or the hard drive location where the SCE file is saved. Click **Export** to export an SCE to an external device. The SCE file extension is **sce**.

Base Patients

From the Content Management options, click **Base Patients** to access the Base Patients panel.

The Base Patients panel appears.



The Base Patients Panel

All Patients are listed in the Base Patients panel.

From the Base Patients panel, users can rename, review, delete and export Patients they have created by clicking the respective buttons next to each Patient.

Click **Import Patient** to import a Patient file from an external device or the hard drive location where the SCE file is saved. Click **Export** to export a Patient file to an external device. The Patient file extension is **pat**.

NOTE: Preconfigured CAE Healthcare Base Patients CANNOT be exported.

Scenarios

From the Content Management options, click **Scenarios** to access the Scenarios panel.

The Scenarios panel appears.

The Scenarios Panel

All Scenarios are listed in the Scenarios panel.

From the Scenarios panel, users can rename, review, delete, import and export Scenarios they have created by clicking the respective buttons within each scenario. Locked Scenarios can only be reviewed.

Users can also create new scenarios from the Scenarios screen by clicking the **Create New Scenario** button.

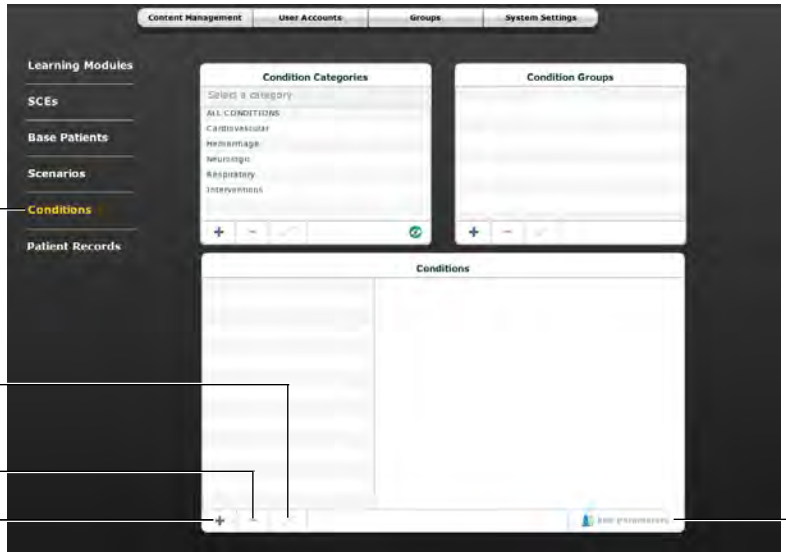
Click **Import** to import a scenario file from an external device or the hard drive location where the SCE file is saved. Click **Export** to export a scenario file to an external device. The scenario file extension is **mss**.

NOTE: Preconfigured CAE Healthcare scenarios CANNOT be exported.

Conditions

From the Content Management options, click **Conditions** to access the Conditions Editor.

The Conditions Editor appears.



The Conditions Editor

All conditions can be viewed in the Conditions panel by selecting their associated categories and groups from the Condition Categories and Condition groups panels.

From the Conditions Editor, users can create new Conditions to be used in SCEs. To create a new condition:

1. From the Condition Categories panel, select a category.

   NOTE: Conditions CANNOT be added to the **Interventions** category.
2. From the Condition Group panel, select a group.
3. In the Conditions panel, click the **Add** button.

   The New Condition Name dialog box appears.
4. Enter a name for the condition in the New Condition Name dialog box.
5. Click **Save**.

   The condition is added to the selected Condition category and group.
6. From the Conditions panel, select the new Condition.
7. Click the **Edit Parameters** button.

   The Parameters screen appears.
8. From the Parameters screen, select the desired Condition parameters.
9. Click **Complete**.

   The condition is saved with the selected parameters.

New condition categories and groups can also be added by clicking the **Add** button in the Condition Categories and Condition Groups panels.

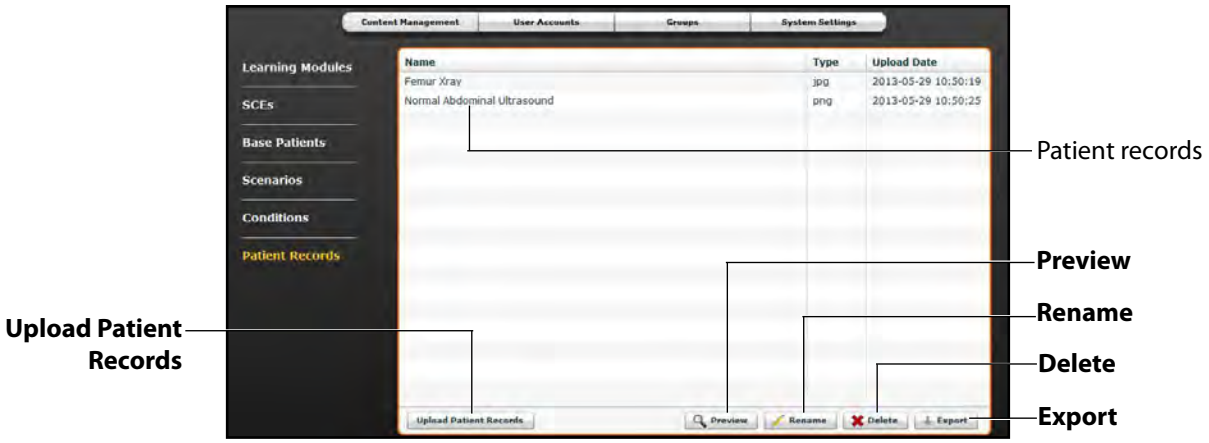
Use the **Delete** and **Rename** buttons in each panel to delete or rename a Condition, group or category.

NOTE: CAE Healthcare Conditions, groups and categories cannot be deleted or renamed.

Patient Records

Patient records can be uploaded to Müse for display in the TouchPro software. Once uploaded, a patient record is available for use with any SCE.

Patient Records are managed from the Patient Records panel on the **Content Management** tab of the System Administration screen.



The Patient Records Panel

The following patient record file types can be uploaded to Müse:

- JPG or JPEG images
- GIF images
- PNG images
- XPS images
- PDF documents
- MPEG videos
- MOV videos
- MP3 audio files

A single patient record file cannot exceed 20MB.

To upload a patient record:

1. From Patient Records panel, click **Upload Patient Records**.

   A file selection window appears.

2. Select the desired file and click **Open** or **OK.**

   The file is uploaded and is now available to display in the TouchPro software.

Müse can store up to 100GB of patient record files. To ensure adequate space, please delete patient records when they are no longer needed.

To delete a patient record:

1. From the Patient Records panel, select the patient record to delete**.**
2. Click **Delete**.

   The patient record is deleted and is no longer available to display in the TouchPro software.

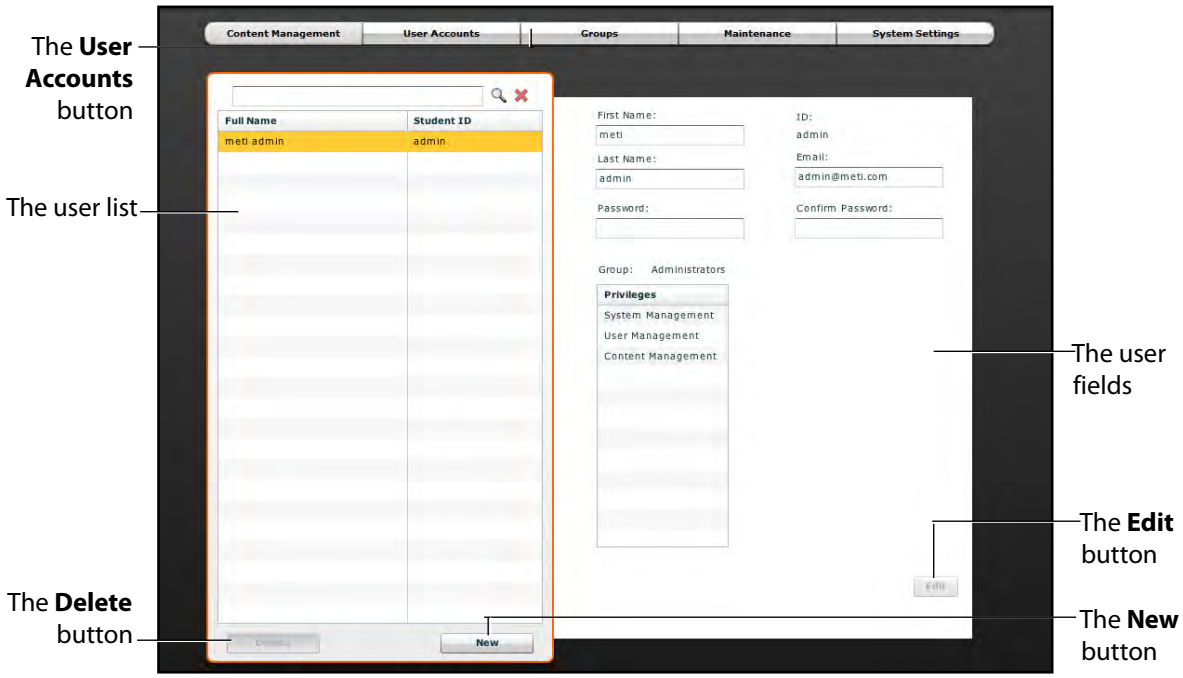
Individual patient records can also be previewed, renamed or exported by selecting the record and clicking **Rename**, **Export** or **Preview**.

For information about displaying patient records in TouchPro, see *Displaying Patient Records on page 70*.

User Accounts

To access the User Accounts panel, from the System Administration screen, click the **User Accounts** button. The User Accounts panel appears.

From the User Accounts panel, users can create, edit and delete users.



The User Accounts Panel

NOTE: User Accounts functions are available only to users with the User Management or System Management privilege.

Creating a User

To create a new user:

1. From the User Accounts panel, click **New**.

   The New Account Creation panel appears.
2. In the New Account Creation panel, enter the user's personal data and choose a password.
3. Assign the user to a group by selecting a group from the **Group** menu.

   NOTE: A user can only be assigned to one group.
4. Click **Create**.

   The new user is created and the New Account Creation panel disappears.

Editing a User

To edit a user's information or privileges:

1. On the User Accounts panel, select the user to edit.
2. Click **Edit**.

   The user fields become editable.
3. Make the desired changes.
4. Click **Save**.

Deleting a User

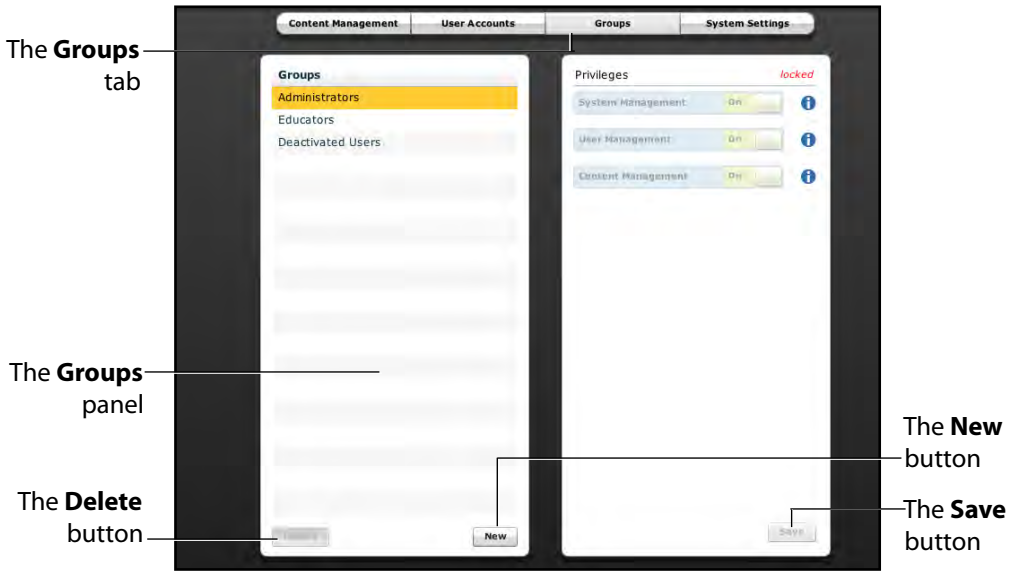
To permanently delete a user, from the User Accounts panel, select a user and click **Delete**. When the User Deletion Warning box appears, click **Yes**.

The user account and the data associated with it are deleted. However, the administrative user deleting the account becomes the owner of any SCEs, scenarios or patients created by the user being deleted (i.e., the SCEs, scenarios and patients created by the deleted user are moved to the deleting user's account).

Groups

Users are assigned to groups to define access privileges. To access the Groups panel, from the System Administration screen, click **Groups**.

The Groups panel appears.



The Groups Panel

NOTE: Groups functions are available only to users with the User Management or System Management privilege.

From the Groups panel, users can create new groups, delete groups and assign privileges to groups.

In the Groups panel, three groups appear by default:

- Administrators
- Educators
- Deactivated Users

Each default group has privileges assigned.

Privilege System

The Müse software has three different privileges:

- System Management
- User Management
- Content Management

User Management and Content Management can be assigned independently or combined. The System Management privilege contains all privileges.

System Management

Users with the System Management privilege have access to all features of the Müse software, including the benefits of the User Management and Content Management privileges, listed below. Users with the System Management privilege can also view system settings, back up and restore data and apply software updates.

User Management

Users with the User Management privilege can manage all users and groups.

Content Management

Users with the Content Management privilege can create and manage all SCEs.

Creating a New Group

To create a new Group:

1. From the Groups panel, click **New**.

   The **Group Name** field appears.
2. Enter the name of the Group in the **Group Name** field.
3. Click **Create Group**.

   The group appears in the Groups panel. Privileges can now be selected.
4. Select the privilege(s) to be assigned to the Group.
5. Click **Save**.

Deleting a Group

Groups can be deleted when they are no longer needed. Once a Group is deleted, all users who were affiliated with the Group are moved to the Deactivated Users Group.

To permanently delete a Group, select the group to be deleted from the Groups panel and click **Delete**. When the Group Deletion warning box appears, click **Yes**.

Providing Access to Content Only

To provide users with the ability to create and manage SCEs but not the ability to manage users or groups:

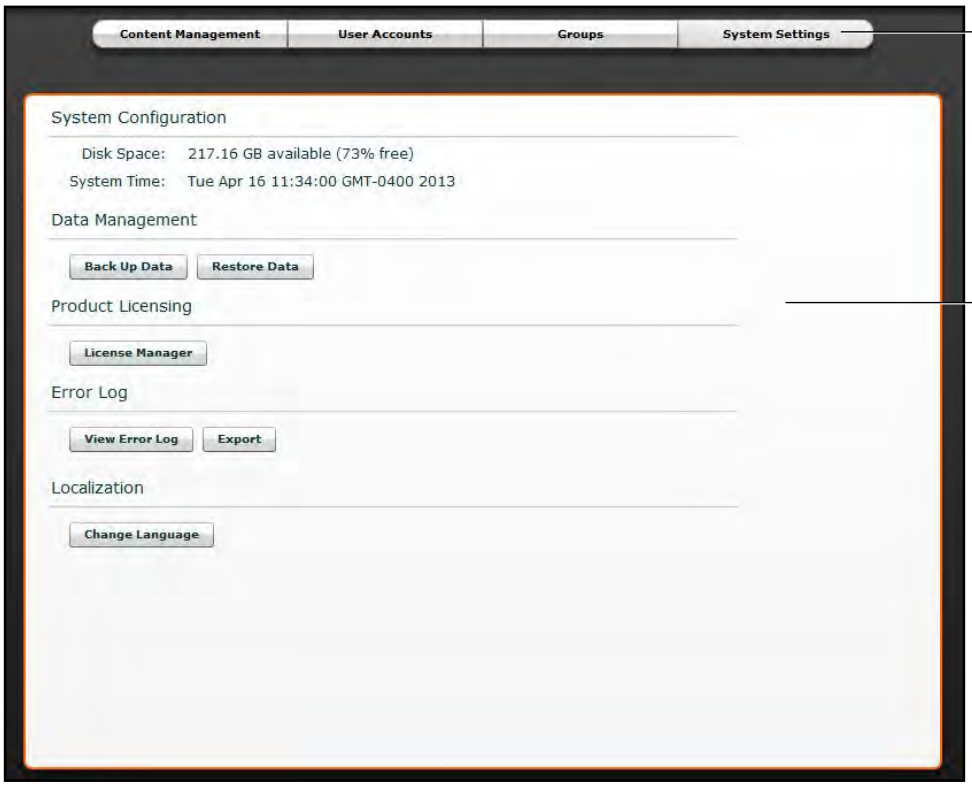
1. Create a new group called Content Only.
2. Assign the group the Content Management privilege. Do NOT assign any other privileges to the group.
3. On the **User Accounts** tab, create or edit the desired users, placing each user in the Content Only group.

System Settings

From the System Settings panel, users can manage the System Configuration, Data Management and Product Licensing of the Müse software.

To access the System Settings panel, from the System Administration screen, click **System Settings**.

The System Settings panel appears.



The System Settings Panel

NOTE: System Settings functions are available only to users with the System Management privilege.

System Configuration

Under System Configuration, Disk Space and System Time are displayed.

Data Management

The Data Management feature allows users to back up data to an external device. Users can also restore the backup data.

Backing Up Data

Back up data to protect and store content and user data.

To back up data:

1. On the System Settings panel, click the **Back Up Data** button.

The Back Up Data Button

   A Save dialog box appears.
2. Select a location to save the backed up data.
3. Click **Save**.

IMPORTANT: To protect content and user information, data should be backed up weekly.

Restoring Data

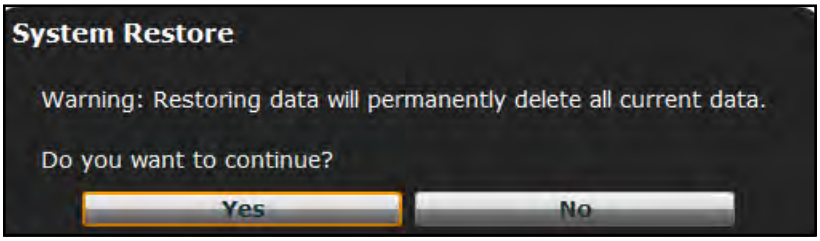
Restore data when the backed up data needs to be replaced on the software. Restoring data only restores the last backup and does NOT merge the backup data with the current data.

To restore backup data:

1. On the System Settings panel, click **Restore Data**.

The Back Up Data Button

The System Restore warning box appears stating that restoring data erases all current data and asks if you want to continue.



The System Restore Warning Box

IMPORTANT: Restoring data ERASES all current data and replaces it with the backed up data.

2. Click **Yes**.

   A select file dialog box appears.

3. Locate the appropriate .bak backup file to restore.
4. Click **Select**. The data is restored.

Product Licensing

To view product licensing information for your simulator or to enter a license key to activate your software, click **License Manager**.

Error Log

The Error Log is available for technicians and is used when diagnosing the Müse software.

IMPORTANT: Do not clear the Error Log.

Localization

To change the language of the Müse software:

1. From the System Settings panel, under the Localization heading, Click **Change Language**.

   The Change Language dialog box appears.

2. Select a language from the dialog box.
3. Click **Accept**.

   The Müse user interface changes to the selected language.

NOTE: Only the English version of the User Guide is available via the software, regardless of the Müse language selection. To access the User Guide in other languages, please visit www.caehealthcare.com and click the **Support** link.

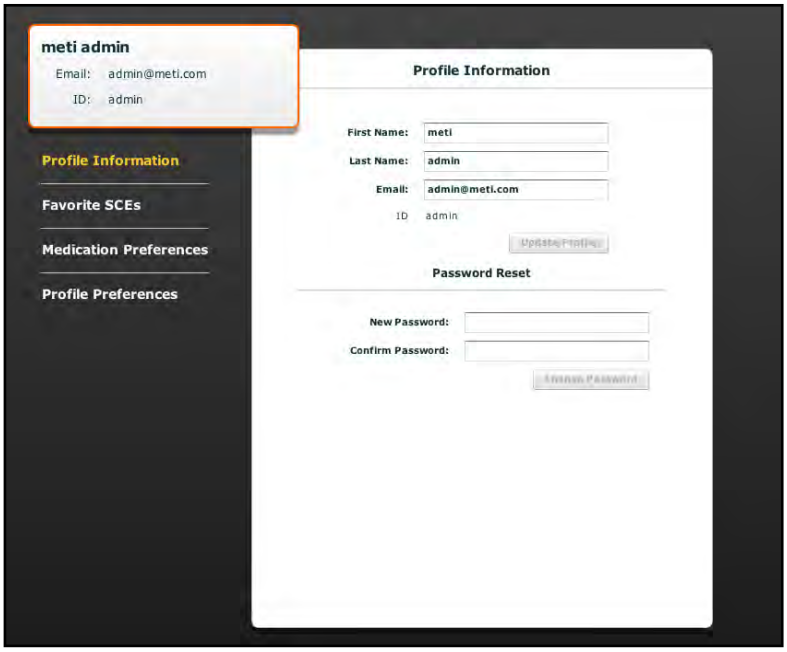
Account Profile

From the Account Profile screen, users can view, update and reset personal profile information. Users can also view and add favorite SCEs from this screen.

Click the **Account Profile** button to access the Account Profile features.

The Account Profile Button

The Account Profile screen appears.

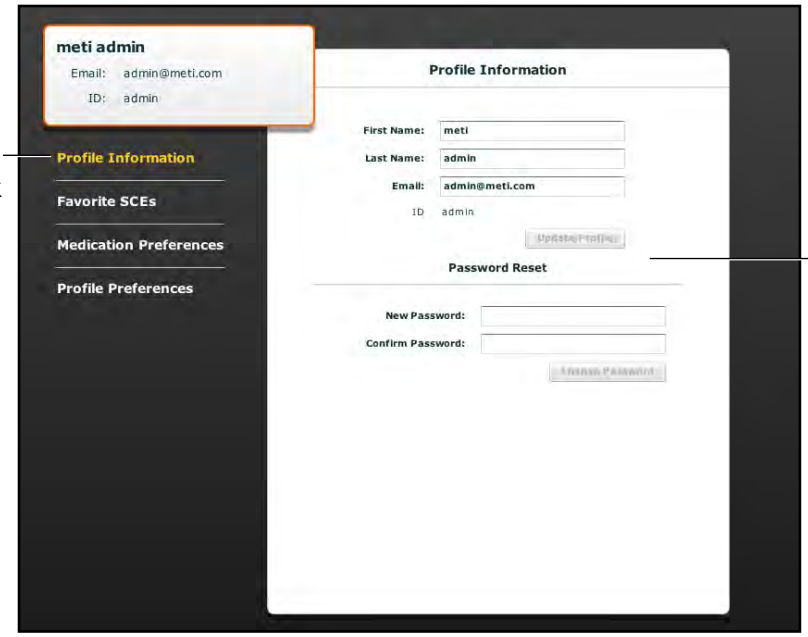


The Account Profile Screen

Profile Information

From the Account Profile screen, the Profile Information panel appears by default. If another panel has been selected, click **Profile Information** to return to the Profile Information panel.

From the Profile Information panel, users can change their profile information and reset their passwords.



The Account Profile Screen

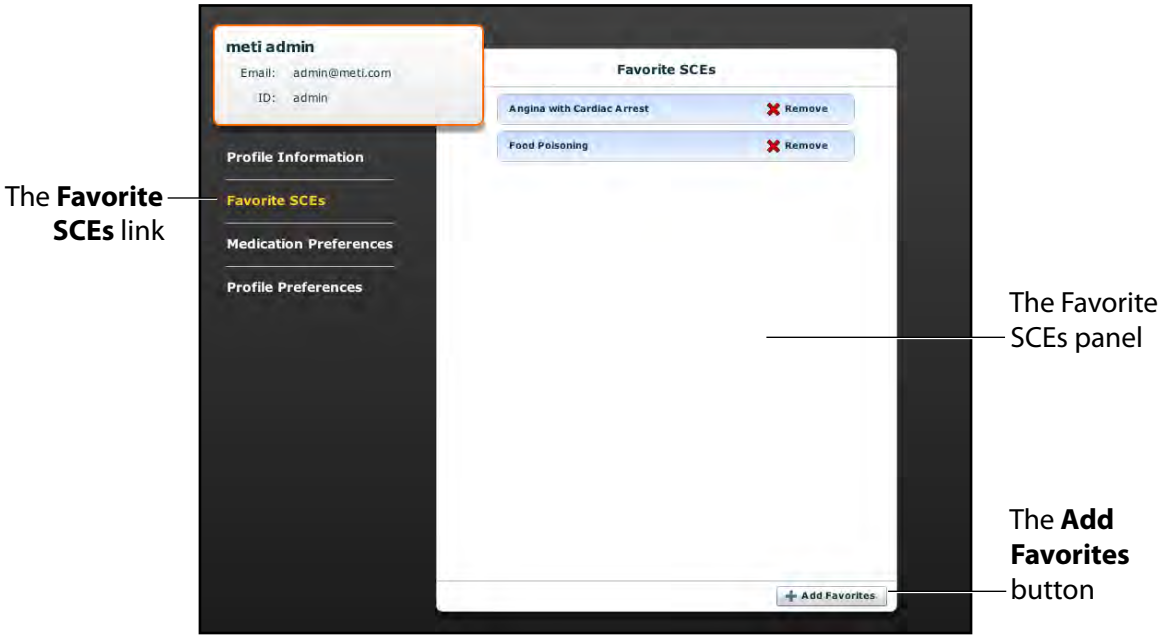
To change profile information, enter the new information in the appropriate fields and click **Update Profile** when finished.

To reset a password, enter the new password in the **New Password** field and re-enter the new password in the **Confirm Password** field. Click **Change Password** when finished.

IMPORTANT: If you change your username or password, you MUST use the new username and/or password upon your next login. You cannot access the system with the old username or password once it has been changed.

Favorite SCEs

To access the Favorite SCEs panel, click **Favorite SCEs** from the Account Profile screen. All of the logged-in user's favorite SCEs appear in the Favorite SCEs panel.



The Account Profile Screen

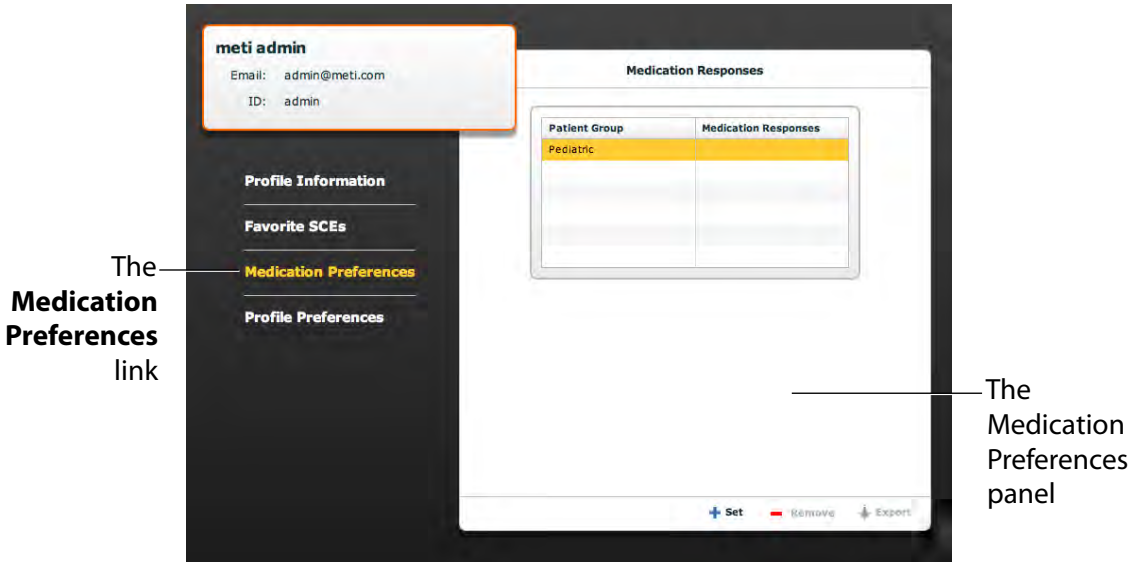
To add SCEs to the Favorite SCEs panel, click **Add Favorites**. The SCE Library appears. Select the desired SCE and it automatically appears in the Favorite SCEs panel.

Medication Preferences

From the Medication Preferences panel, users can import customized medication response files created in the Pharmacology Editor software.

To access Medication Preferences, click **Medication Preferences** on the Account Profile screen.

The Medication Preferences panel appears.



The Account Profile Screen

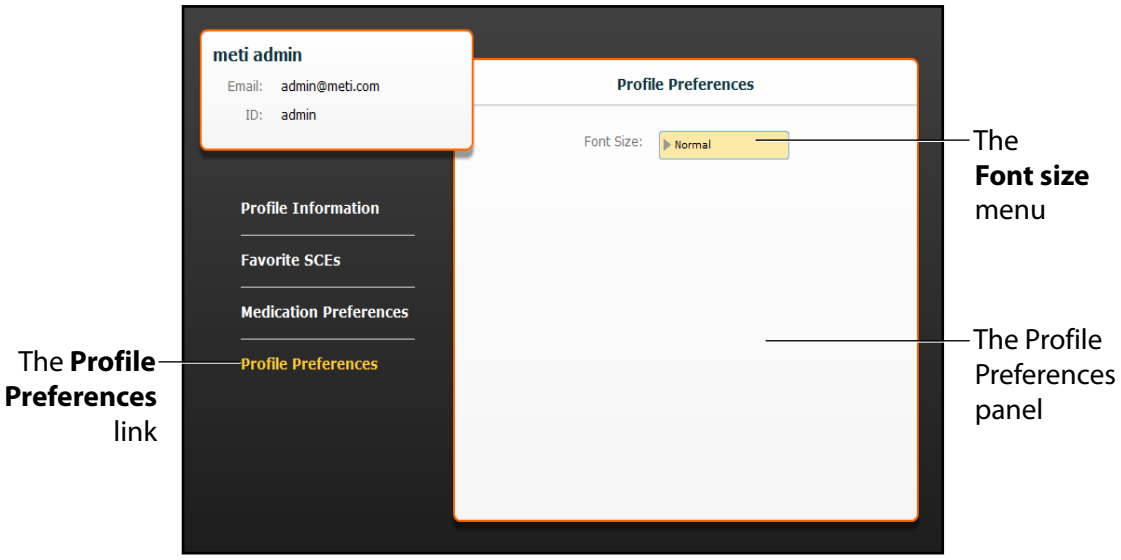
To import medication response files, click the **Set** button. The select file dialog box appears. Select the medication response file to be added and click **Open** or **OK**.

Profile Preferences

From the Profile Preferences panel, users can change the font size used in the software.

To access Profile Preferences, click **Profile Preferences** on the Account Profile screen.

The Profile Preferences panel appears.



The Account Profile Screen

To change the font size, click on the **Font size** selection. The **Font size** drop-down menu appears.

From the **Font size** drop-down menu, select **Normal**, **Small** or **Large**.

USING TOUCHPRO

The TouchPro software enables users to view patient physiology.

The software can be used from the Instructor Workstation or on another computer provided the computer has joined the simulator's wireless network.

IMPORTANT: Only two TouchPro software screens can be open at a time.

Accessing the TouchPro Software

Like the Müse software, the TouchPro software is compatible with computers that have touch-screen capabilities.

To run the TouchPro software, the Instructor Workstation must be connected to the simulator's network.

IMPORTANT: An SCE must be running on the Müse software for any physiological data to be displayed on the TouchPro software. The TouchPro software can only show one Patient at a time.

To launch TouchPro from the Instructor Workstation:

1. With the Müse software running, open a new tab in the web browser and go to the **Home** page of the web browser.

   The Müse Start Screen appears.

The Müse Start Screen

2. Select the **TouchPro** icon.

When TouchPro opens, the simulated patient monitor appears.

The TouchPro Display

NOTE: The capnogram waveform is not displayed on the TouchPro software from the Instructor Workstation. Capnogram information can be found on the clinical patient monitor if one is connected to the simulator.

Modifying the TouchPro Display

The layout of the waveforms and numeric data shown on the TouchPro software can be customized.

The TouchPro software can show up to six waveforms plus an additional four numeric readouts.

Selecting a Preconfigured Layout

There are five preconfigured CAE Healthcare Layouts:

ICU-Arterial Line Only - preconfigured with waveform and numeric readouts for ECG Lead II, ECG Lead V, ABP, Pleth and a numeric readout for Body Temperature.

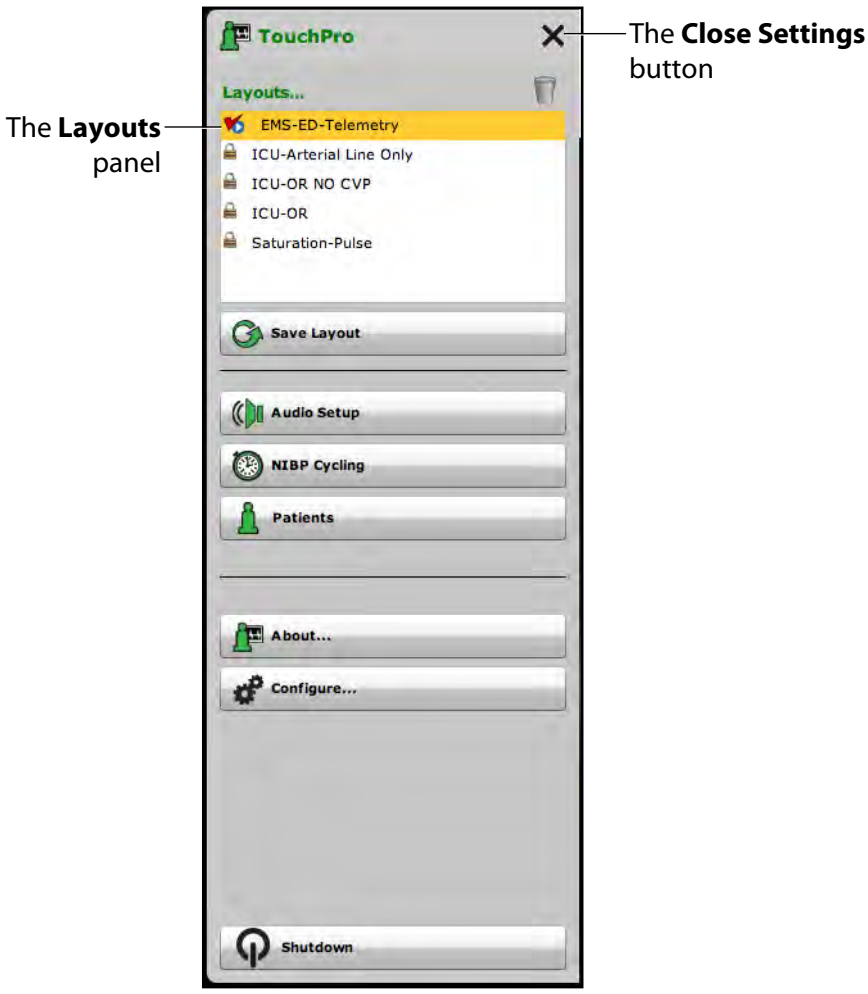
EMS-ED-Telemetry - preconfigured with a waveform and numeric readout for ECG Lead II and numeric readouts for SpO_2 and noninvasive blood pressure (NIBP).

ICU-OR No CVP - preconfigured with waveform and numeric readouts for ECG Lead II, ECG Lead V, ABP, PAP and Pleth, and numeric readouts for NIBP, Thermodilution C.O., Blood Temperature and Body Temperature.

ICU-OR - preconfigured with waveform and numeric readouts for ECG Lead II, ECG Lead V, ABP, PAP, CVP and Pleth, and numeric readouts for NIBP, Thermodilution C.O., Blood Temperature and Body Temperature.

Saturation-Pulse - preconfigured with numeric readouts for SpO_2 and pulse.

To select a preconfigured layout, click **Settings**, select the layout from the Layouts panel and click the **Close Settings** button.



The TouchPro Settings Menu

NOTE: Preconfigured layouts must be enabled in the Müse TouchPro Setup for the currently running SCE to be accessible in the Layouts panel..

For more infomation about enabling preconfigured layouts, see *Modifying the TouchPro Setup on page 106*.

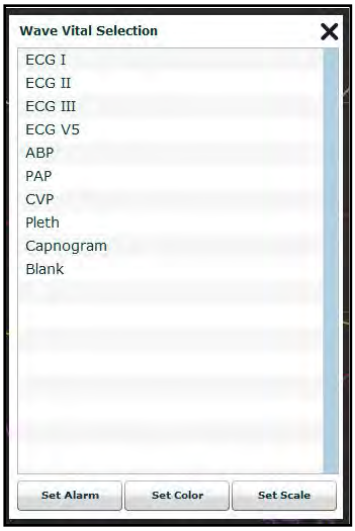
Changing a Waveform or Numeric Display

Waveforms and numeric displays can be changed to suit the user's needs.

To change a waveform or numeric display:

1. Click the waveform or numeric to be changed.

   The Wave Vital Selection menu or the Numeric Vital Selection menu appears, displaying all the available waveforms or numerics.



The Wave Vital Selection Menu

2. Select the desired waveform or numeric.

   The new waveform or numeric is reflected on the screen.

From the **Wave Vital Selection** menu, the alarm, color and scale can be set for the waveform using the **Set Alarm**, **Set Color** and **Set Scale** buttons. From the **Numeric Vital Selection** menu, the color and alarm for the numeric can also be established using the **Set Color** and **Set Alarm** buttons.

Adding a Waveform

The TouchPro software supports up to six waveforms.

To add a waveform:

1. Click the **Settings** button in the bottom right corner of the TouchPro display.

The Settings Button

The Settings menu opens and the **Add Waveform** and **Remove Waveform** buttons appear.

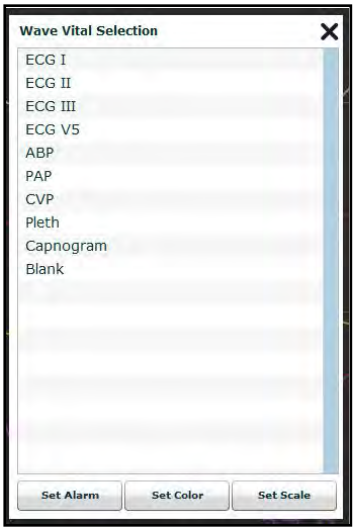
2. Click the plus button in the location above which you want the empty waveform to appear.

   An empty waveform field appears.

The TouchPro Display Settings

3. Click the empty waveform field.

The Wave Vital Selection menu appears.



The Wave Vital Selection Menu

4. Select the desired waveform from the Wave Vital Selection menu.

   The new waveform is reflected on the screen.

Adding a Numeric Display

The TouchPro software contains four numeric display fields. All four numeric display fields are located on one row beneath the waveform displays.

When fewer than four numeric readouts are being displayed, the remaining fields are blank.

To add a numeric to a blank display field:

1. Click a blank numeric display field.

The TouchPro Display

The Numeric Vital Selection menu appears.

The Numeric Vital Selection Menu

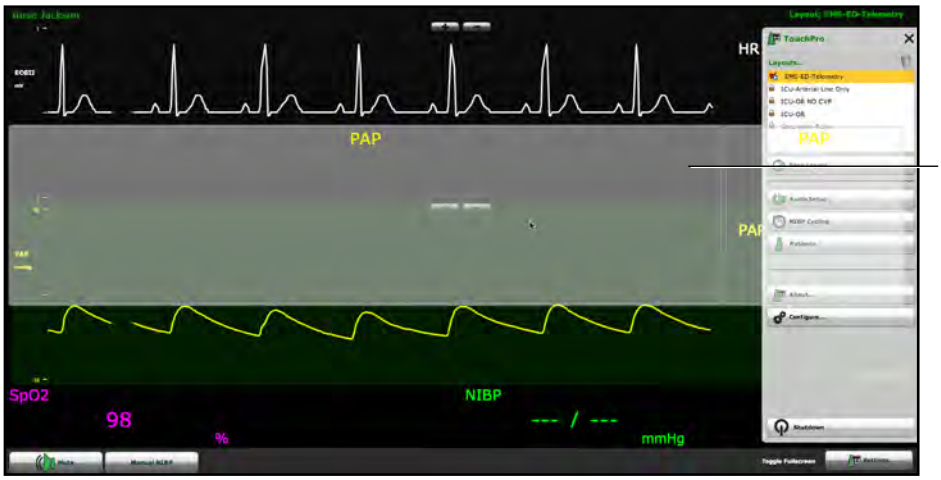
2. Select the desired numeric.

   The new numeric vital display is reflected on the screen.

Moving a Waveform or Numeric Display

Waveforms and numerics can be moved on the screen to suit the user's needs.

To move a waveform or numeric, click the desired waveform or numeric and drag and drop the display to a desired location.



The TouchPro Display

Saving a Layout

Once a layout has been configured, it can be saved and reused.

To save a layout:

1. Ensure the desired waveforms and numerics are in place.
2. Click **Settings**.

   The Settings menu appears.
3. Click **Save As**.

   The Save Layout window appears.
4. In the Save Layout window, in the **Layout Name** field, enter a name for the layout

The Save Layout Window

5. Click **Save.**
6. Click the **Close** button to exit the Settings menu.

Saved layouts can be deleted from the Settings menu by dragging and dropping them in the Trash.

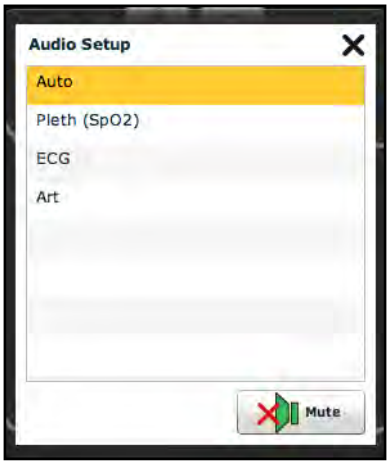
NOTE: When a layout is saved, it is available for use only with the current SCE. To enable the layout for use with any other SCE, enable the layout from the TouchPro Setup panel for the desired SCE.

Sounds

All sounds can be silenced by clicking the **Mute** button in the bottom left corner of the TouchPro display.

The Mute Button

To set up the audio for the TouchPro, from the Settings menu, click **Audio Setup**.



The Audio Setup Menu

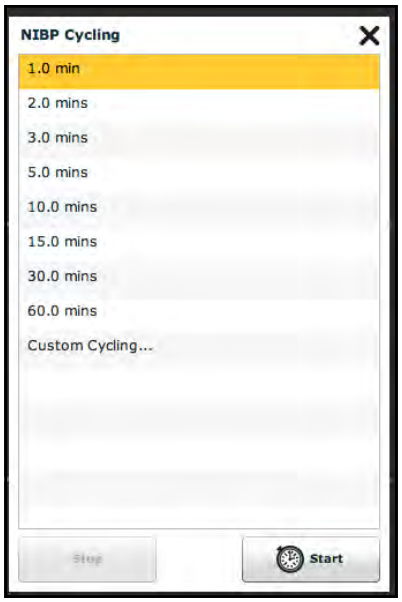
From the Audio Setup window, select a waveform to set it as the pulse sound. Once a waveform is selected, the Audio Setup window automatically closes.

Clicking the **Mute** button from the Audio Setup window mutes all alarms. Click the **Mute** button again to return the alarms to their original state.

NIBP Cycling and Manual NIBP

When non-invasive blood pressure (NIBP) is displayed, the patient's NIBP can be updated at specified intervals using NIBP Cycling, or the current NIBP can be displayed immediately using the **Manual NIBP** button.

To set the patient's NIBP to be updated at regular intervals, from the Settings menu, click **NIBP Cycling**. The NIBP Cycling menu appears. From the NIBP Cycling menu, select the desired interval for the cycling and click **Start**.



The NIBP Cycling Menu

Custom cycling is also available.

To display the patient's current NIBP, click the **Manual NIBP** button.

The TouchPro Display

The current NIBP is displayed.

NOTE: Manual NIBP can be used at any time during cycling. However, this turns off auto-cycling.

Patients

To view the available Patients, click the **Settings** button in the lower right corner of the TouchPro screen. The Settings menu appears. From the Settings menu, click **Patients** to view the current Patient.

The Available Patients

NOTE: When connected to the simulator, the TouchPro only displays the active Patient.

Configuring the TouchPro Software

The background color and alarm suspension time can be set from the TouchPro Configure panel.

To access the Configure panel:

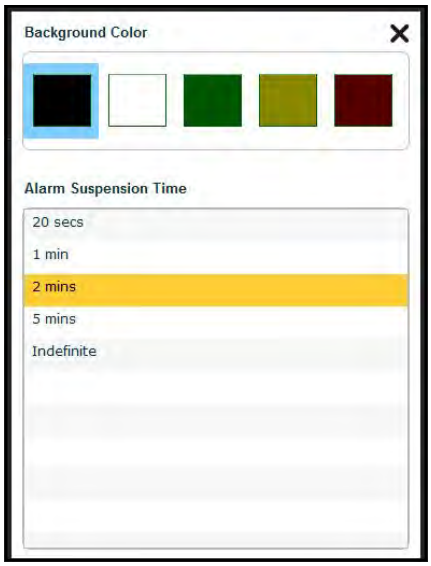
1. Click the **Settings** button in the bottom, right corner of the TouchPro screen.

   The Settings menu appears.

2. From the Settings menu, click the **Configure** button.

   The Configure panel appears.

3. From the Configure panel, set the background color and alarm suspension time.



The Configure Panel

4. Click the **Exit** button to exit the Configure panel when finished.

Changing the TouchPro Language

To change the language of the TouchPro software:

1. Click the **Settings** button in the bottom, right corner of the TouchPro screen.

   The Settings menu appears.

2. From the Settings menu, click the **Language Selection** button.

   The Language Selection panel appears.

3. From the Language Selection panel, select a language.

The Language Selection Panel

4. Click **Accept**.

   The TouchPro software changes to the selected language.

Exiting the TouchPro Software

To exit TouchPro:

1. Click the **Settings** button from the bottom, right corner of the TouchPro screen.

   The Settings menu appears.

2. From the Settings menu, click **Shutdown**. A warning box appears asking if you want to exit.

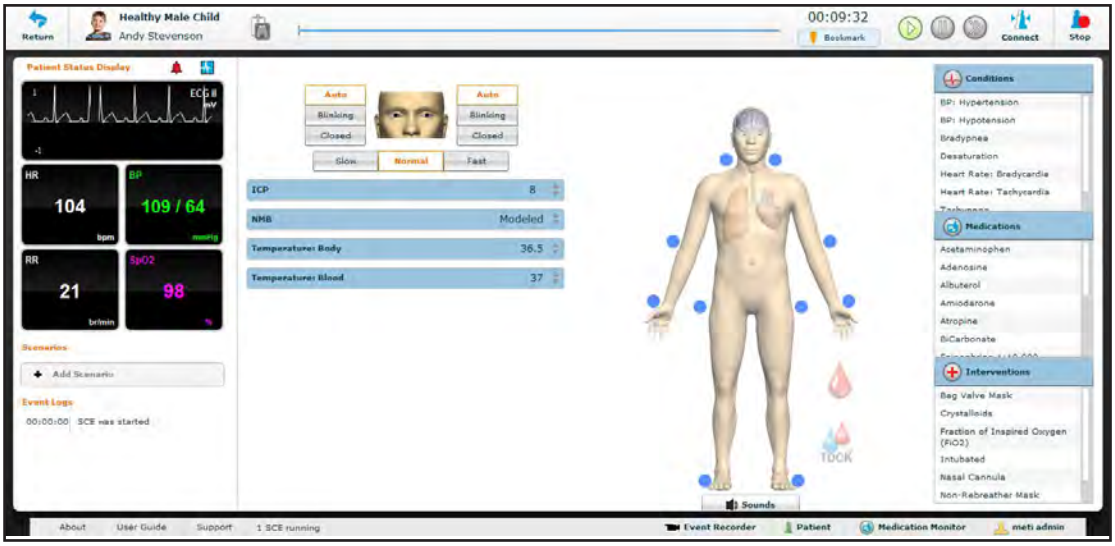
3. Click **Shutdown**.

   TouchPro shuts down and the Müse Start Screen appears.

Using the System

Once the PediaSIM ECS has been set up (see the **Getting Started** section), the software has been loaded and an SCE has been started (see the **Using the Software** section), the simulator is ready for learner interventions. The method of producing a specific clinical situation may involve the mannequin, the software, or both. Likewise, user interventions can take place with the mannequin, the software, or with a combination of the two.

From the Run screen, the features of the PediaSIM ECS can be accessed. On the following pages is a breakdown of the various clinical features and how they are utilized. It is separated into the following categories: Neurological, Respiratory, Cardiovascular, Fluids and Sounds. (The TDCK is optional.)



The Run Screen

Parameters

The Müse software has a number of parameters that control the physiological features of the PediaSIM ECS. The parameters are grouped by category: Neurological, Respiratory, Cardiovascular, Fluids and the TDCK (Optional). Each screen lists default Basic parameters. However, when the **Basic/Additional** switch, located on the Run screen, is activated, more parameters become available.

The Basic/Additional Switch

Below is a table that lists all of the Basic PediaSIM ECS parameters.

Basic Parameters				
Neurological	**Respiratory**	**Cardiovascular**	**Fluids**	**TDCK**
Eyes: Blink Speed	Swollen Tongue	Blood Pressure	Fluid Loss Blood	Hemorrhage Channel 1
NMB	Airway Occluder	Heart Rate	Fluid Loss Plasma	Hemorrhage Channel 2
Temperature: Body	Laryngospasm	Heart Rate Factor	Colloid Infusion	Hemorrhage Channel 3
Temperature: Blood	Needle Decompression	Cardiac Rhythm	Crystalloid Infusion	Hemorrhage Channel 4
	Bronchial Occlusion	Arterial Catheter	PRBC Infusion	Hemorrhage Channel 5
	Respiratory Rate	Central Venous Catheter	Whole Blood Infusion	Hemorrhage Channel 6
	Respiratory Rate Factor	PA Catheter		
	Shunt Fraction	PA Balloon		
	SpO_2	Defib		
	NMB	Pacing Current		
	Tidal Volume	Pacing Rate		
	Intrapleural Volume: Left	Pacing Capture Threshold		
	Intrapleural Volume: Right	Cold Fluid Inject		
	Fraction of Inspired O_2			

Additional parameters available are shown in the table below.

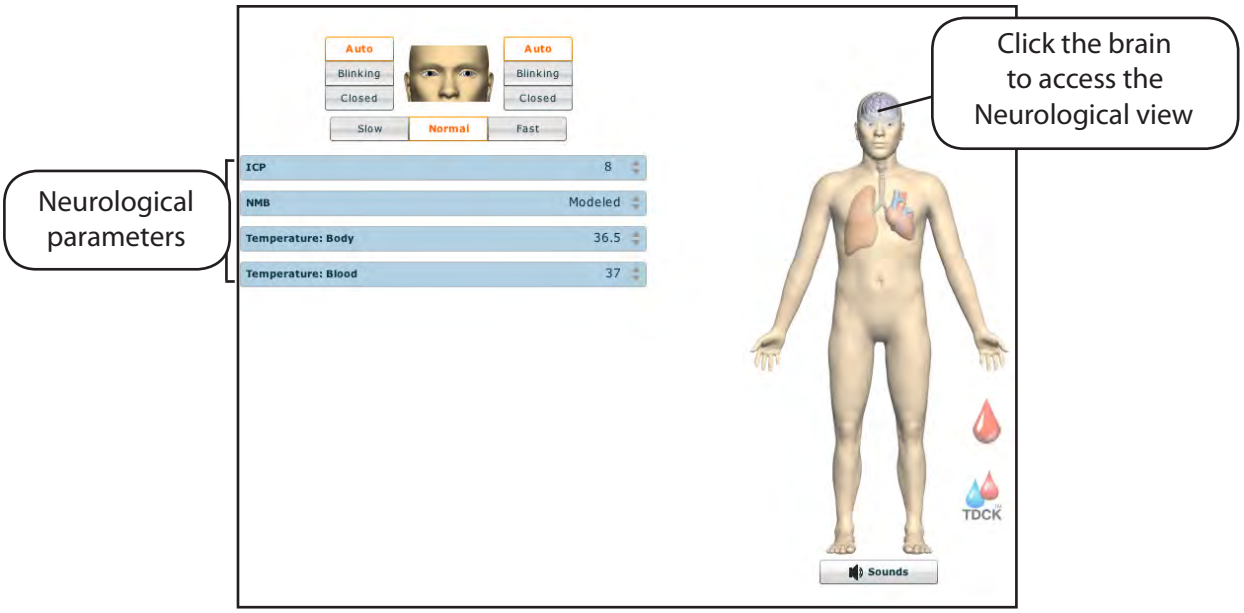
Additional Parameters				
Neurological	**Respiratory**	**Cardiovascular**	**Fluids**	**TDCK**
None	Respiratory Rate Tidal Volume Tidal Volume Factor pH Shift PEEP O_2 Consumption CO_2 Production Factor $PaCO_2$ Set-point I to E Ratio (1:X) $PetCO_2$-$PaCO_2$ Factor Respiratory Gain Factor Respiratory Quotient Volume/Rate Control Factor Chest Wall Capacity Chest Wall Compliance Factor Distended Chest Wall Compliance Factor Functional Residual Capacity Lung Compliance Factor: Left Lung Compliance Factor: Right Venous CO_2 Shift Bronchial Resistance Factor: Left Bronchial Resistance Factor: Right Alveolar Enflurance Alveolar Halothane Alveolar Isoflurane Alveolar Sevoflurane	Baroreceptor Maximum Pressure Baroreceptor Minimum Pressure Left Ventricle Contractility Factor Right Ventricle Contractility Factor Systemic Vascular Resistance Factor Venous Capacity Factor Systemic Arteries Compliance Factor Pulmonary Arteries Compliance Factor Pulmonary Vasculature Resistance Factor Venous Return Resistance Factor Baroreceptor Gain (Overall) Factor Baroreceptor Gain (Cardiac) Factor Baroreceptor Gain (Peripheral) Factor Chest Compression Efficacy Tamponade Volume Aortic Valve Resistance Factor Mitral Valve Resistance Factor Pulmonic Valve Resistance Factor	None	None

Employing Clinical Features

The method of producing a specific clinical situation may involve the mannequin, the software, or both. Likewise, user interventions can take place with the mannequin, the software, or with a combination of the two. Below is a breakdown of the various clinical features and how they are utilized.

Neurological

The PediaSIM ECS can simulate a variety of neurological clinical indicators, such blinking eyes and pupil control.



The Neurological View

Neurological System			
Anatomy, Physiology and Clinical Signs	**Clinical Interventions, Patient Monitoring and Scenarios**	**Software Control**	**Manual Control**
Eye Signs	Eye blinking and pupil size can be set independently for the left and right eye.	Eye blinking can be set by the instructor. VIEW: **Neurological** PARAMETERS: Eyes: **Blink Control and Eyes: Blink Speed**	Manual adjustments for normal (3.5 mm), blown (8 mm) and pinpoint (2 mm) settings. See *Eye Sign Adjustment.*

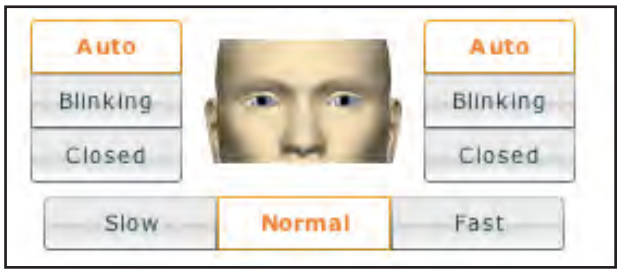
Eyes

Each pupil of the mannequin can be set independently to a fixed diameter of 2, 3.5 or 8 mm (pinpoint, normal or blown) by carefully lifting the eyelid and rotating the eye from left to right or right to left until the proper size appears.

Adjusting the Eyes

Additionally, eyelids can be programmed to open and close spontaneously or can be fixed in the closed position. When closed, learners can manually open the eyelids for clinical inspection.

The settings for Blink Control are located on the **Neurological** view.



Blink Speed Controls

Choosing the **Auto** setting (which is also the default setting) sets the eyes in a blinking mode but allows the simulator to react to physiological changes that cause the eyes to close such as unresponsiveness or a comatose condition.

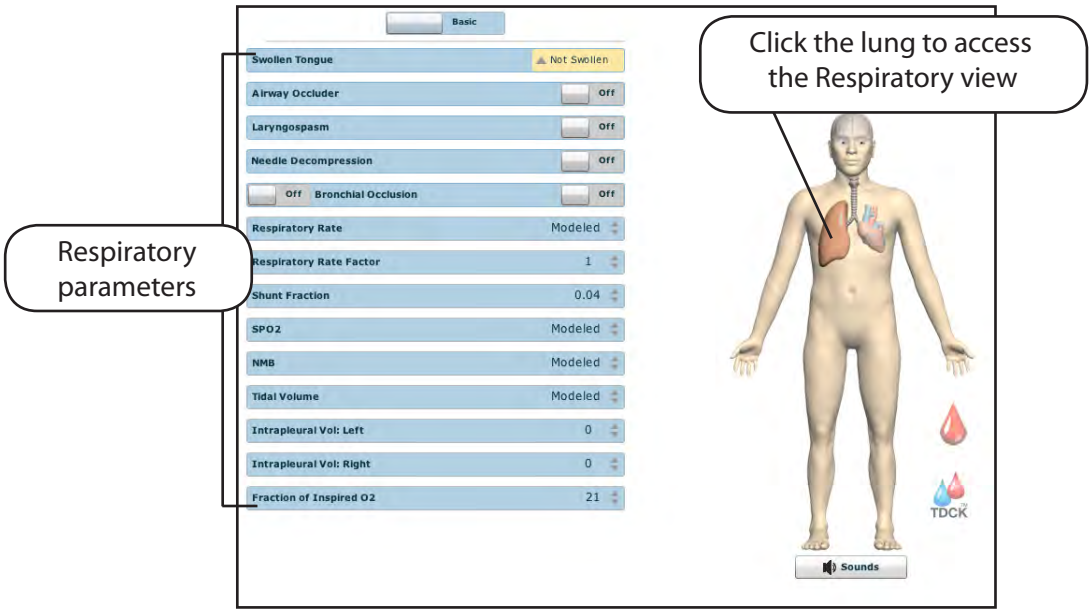
Though set in the **Closed** position, the eyelids can still be manually opened for clinical inspection.

Additionally, eyelids can be programmed scenarios to open and close spontaneously or can be fixed in the closed position.

Blinking frequency can be set at one of three speeds: **Normal** (the default), **Slow** and **Fast**. To adjust the blinking frequency, click the desired option on the **Neurological** view.

Respiratory

The mannequin's anatomically realistic upper airway provides the opportunity to intubate the patient as well as apply other airway interventions, while various clinical signs (e.g., breath sounds, chest excursion, airway patency) can be physically demonstrated. The mannequin's lungs produce carbon dioxide and react realistically to intubation as well as to pathophysiologic states. The patient's upper chest rises and falls synchronously with the inflationary state of the underlying lungs. In addition, the mannequin's lungs react realistically to intubation as well as to pathophysiologic states. A series of speakers inside the mannequin simulate a range of breath sounds used in diagnosing conditions. Breath sounds can be auscultated over the left and right apex, axilla and posterior *(Breath Sounds are discussed further on page 197 of this User Guide)*.



The Respiratory View

Respiratory System			
Anatomy, Physiology and Clinical Signs	**Clinical Interventions, Patient Monitoring and Scenarios**	**Software Control**	**Manual Control**
Airway Management and Ventilation	Alveolar and arterial gas concentrations appropriately reflect the efficacy of ventilation and oxygen administration.	Oxygen administration must be input by the instructor. VIEW: **Respiratory** PARAMETER(S): **Fraction of Inspired O_2**	None required.
Arterial Blood Gases	PaO_2, $PaCO_2$ and pH are continuously calculated and displayed on the Patient Status Display and the TouchPro software.	None required, but adjustable. VIEW: **Respiratory** PARAMETER(S): **Multiple**	None required.
Bronchial Occlusion	Completely obstructs the right and left mainstem bronchi, simulating a lower airway obstruction (e.g., mucus plug). This yields an inability to ventilate the lungs.	VIEW: **Respiratory** PARAMETER(S): **Bronchial Occlusion**	None required.
Chest Excursion	Synchronized with ventilation (spontaneous or mechanical). Excursion depth proportional to tidal volume.	None required.	None required.
Chest Tube Placement	Chest tubes can be inserted bilaterally into the mid-axillary line of the fifth intercostal space. Suction equipment can be applied to withdraw fluid from the simulated intrapleural space.	The instructor must adjust the amount of physiologic intrapleural fluid present. VIEW: **Respiratory** PARAMETER(S): **Intrapleural Volume**	See *Chest Tube Setup.*
Cricothyroid Membrane	Allows needle cricothyrotomy, transtracheal jet ventilation, retrograde wire techniques and cricothyrotomy.	None required.	See *Cricothyrotomy Setup*
Esophagus, Lower Esophageal Sphincter and Stomach	Esophageal intubation results in gastric distention and the absence of breath sounds, chest excursion, and CO_2 output.	None required.	None required.
Exhaled CO_2	Measure the presence or absence of exhaled CO_2.	None required.	None required.
Laryngospasm	Closes vocal cords and prevents intubation and ventilation. When used with posterior pharynx swelling, creates a "can't intubate, can't ventilate" scenario.	VIEW: **Respiratory** PARAMETER(S): **Laryngospasm**	None required.
Needle Decompression	Decompression of a pneumothorax can be performed bilaterally by inserting a needle at the midclavicular line of the second intercostal space.	The instructor must adjust the amount of physiologic intrapleural fluid present. VIEW: **Respiratory** PARAMETER(S):**Needle Decompression**	See *Needle Decompression Setup.*
Posterior Pharynx Swelling	Obstructs view of larynx to prevent intubation, but allows mask ventilation to create a "can't intubate, can ventilate" scenario.	VIEW: **Respiratory** PARAMETER(S): **Airway Occluder**	None required.
Pulse Oximetry	Oxyhemoglobin saturation (SpO_2) automatically correlates with the oxygen concentration in the lungs and the intrapulmonary shunt fraction.	None required, but adjustable. VIEW: **Respiratory** PARAMETER(S): **Shunt Fraction**	None required.
Realistic Upper Airway (Oropharynx, Nasopharynx,and Larynx)	Direct laryngoscopy, oral and nasal intubation, specialty airway devices (e.g., endotracheal tubes and oropharyngeal airways).	None required.	None required.
Spontaneous, Self-Regulating Breathing	Normal tidal breathing and pathophysiological conditions such as atelectasis, pneumothorax, asthma and Chronic obstructive pulmonary disease (COPD).	None required, but adjustable. VIEW: **Respiratory** PARAMETER(S): **Multiple**	None required.
Symmetric and Asymmetric Lung Ventilation	Tracheal, pathophysiologic conditions such as pneumothorax.	None required, but adjustable. VIEW: **Respiratory** PARAMETER(S): **Multiple**	None required.
Tongue Swelling (Moderate and Severe)	Hinders, but does not prevent, intubation.	VIEW: **Respiratory** PARAMETER(S): **Swollen Tongue**	None required.
Trachea, Left and Right Mainstem Bronchi	Tracheal intubation results in bilateral chest excursion and breath sounds. Endobronchial intubation results in unilateral chest excursion and breath sounds.	None required.	None required.
Venous Blood Gases	PvO_2 and $PvCO_2$ are continuously calculated and displayed on the Patient Status Display and the TouchPro software.	None required, but adjustable. VIEW: **Respiratory** PARAMETER(S): **Multiple**	None required.

Realistic Airway

The mannequin's anatomically realistic upper airway provides the opportunity to intubate the patient, as well as apply other airway interventions, while various clinical signs (i.e., breath sounds, chest excursion, airway patency) can be physically demonstrated.

Intubation

The upper airway of the PediaSIM ECS is designed to allow for intubation and laryngoscopy. Oral and nasal intubation can be performed using a variety of airway devices, including LMAs, endotracheal tubes, nasal-pharyngeal airways and oropharyngeal airways. *For supported sizes, see Recommended Clinical Supply Sizes on page 213.*

WARNING: Airways can be damaged by improper insertion of an airway adjunct (e.g., Endotracheal Tube). To protect the airway, lubricate the adjunct prior to insertion using the silicone spray provided.

Use ONLY the provided SILICONE SPRAY to lubricate the adjunct. NEVER use a water-based lubricant because of resulting residue damage.

Cricothyrotomy Setup

To replicate a needle cricothyrotomy using the PediaSIM ECS:

1. Spray the silicone lubricant into the airway prior to the simulation session.
2. Locate the simulated cricothyroid membrane sealed with tape underneath the neck patch.
3. Follow standard clinical techniques and palpate to find the cricothyroid space.
4. Puncture the space through the neck patch of the patient mannequin and into the tape "membrane." This puncture goes all the way through to the "trachea," simulating the clinical procedure.

Users may wish to replace the tape that simulates the cricothyroid membrane after each cricothyrotomy. Replace the neck patch only when it is showing signs of wear.

Airway lubricant, spools of tape and an additional neck patch are in the Replacement Kit.

Replacing the Cricothyrotomy Tape

1. Remove the old, punctured tape completely from the cricoid feature and use alcohol (an alcohol prep pad works well) to clean the glue residue from the surface.
2. Allow to dry.
3. Cut two approximately 2.25 inch (6 cm) lengths of the clear tape from the roll provided.
4. Carefully apply the first piece of tape to the upper portion of the cricoid feature. Once this is secured, apply the second piece to the lower part of the cricoid feature, overlapping the bottom of the first piece of tape.
5. Cut a 2.5 to 3.0 inch (7 to 8 cm) length of red tape and apply it over the cricoid feature and the clear tape.

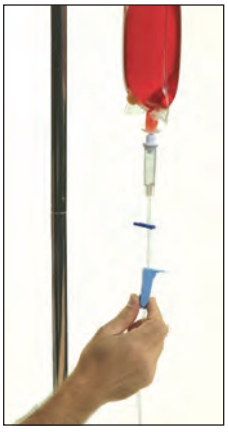
Resealing the Membrane after a Puncture

To reseal the cricoid feature, apply a small piece of red tape over the punctured area. This can be repeated a brief number of times, but when the number of layers impedes the cricothyrotomy, all existing tape must be removed and replaced with new tape.

Chest Tube Setup

To use the chest tube feature:

1. Set up an IV pole near the PCU.
2. Fill an IV bag with the appropriate colored liquid (e.g., for simulated blood, mix distilled water with 5 mL of red food dye and fill the bag). Be careful not to make the mixture too thick, as this can clog the system.
3. Attach the IV solution set to the IV bag and make sure the roller clamp is closed.



Simulated Blood

4. Hang the bag on the IV pole.
5. Connect the hose from the IV solution set to the white Trauma Source hose in the Umbilical Assembly.
6. Once the hoses are connected, open the clamp and allow the fluid to flow into the mannequin. A reservoir inside the mannequin collects the fluid.
7. Insert the chest tube priming hose or a chest tube (lubricated with silicone spray) into the insertion point at the mid-axillary line of the fifth intercostal space on either side of the mannequin. The tube must be inserted far enough to engage the valve on the reservoir. The system is primed when fluid flows from the hose.

Chest Tube Insertion Point

8. Remove the priming hose and replace it with a chest tube. *For supported chest tube size, see Recommended Clinical Supply Sizes on page 213.*
9. Repeat the priming procedure on the left side of the mannequin.

NOTE: Clean up is very important when using simulated fluids. *See the Care/Maintenance section of this User Guide for proper cleanup instructions.*

Needle Decompression

To utilize Pneumothorax Needle Decompression:

1. In the Müse software, from the **Respiratory** view, locate the **Needle Decompression** parameter.
2. Click the **Off** switch. After a few seconds, click the **On** switch.

Needle Decompression Switch

The momentary enabling of Needle Decompression allows air pressure into the mannequin's internal air reservoir, charging the reservoir. Once the air reservoir is filled, the system is primed and ready for a needle decompression puncture.

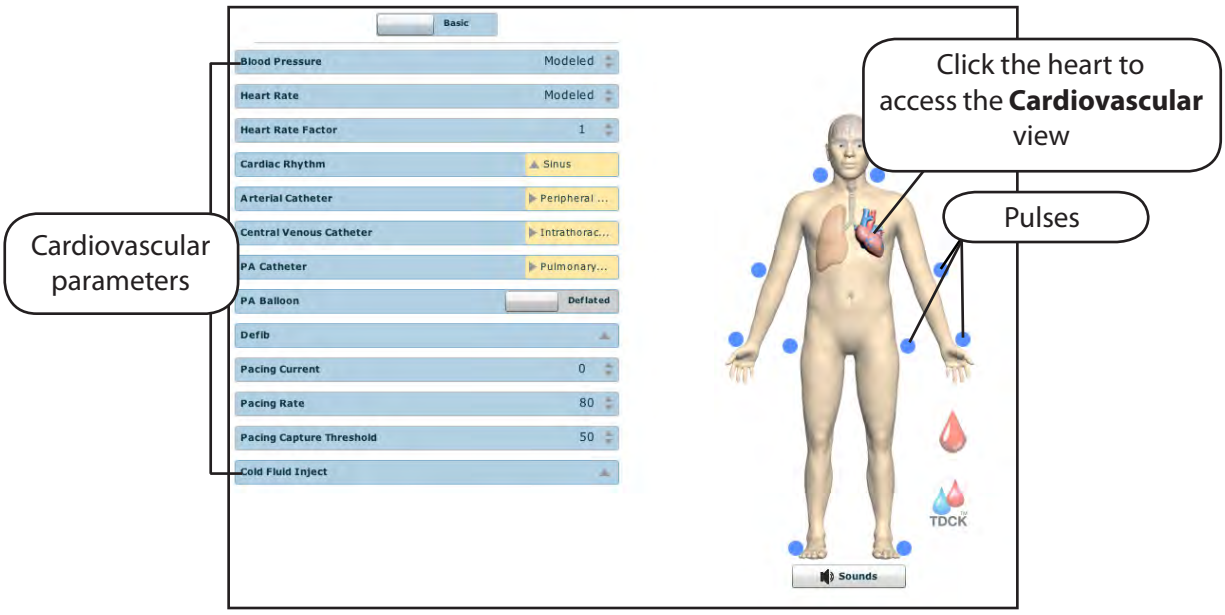
3. Insert the needle and catheter into the small hole located in the left or right mid-clavicular line of the second intercostal space until the hissing sound of the valve release is heard. If no sound is heard, the needle wasn't inserted properly (either in terms of depth or location). *For supported needle size, see Recommended Clinical Supply Sizes on page 213.*

Needle Decompression Insertion

4. In the Müse software, adjust the **Left and/or Right Intrapleural Volume** parameters located on the Respiratory view to 0 mL.

Cardiovascular

The mannequin produces realistic heart sounds and a wide range of pathophysiologic conditions synchronized to the QRS complex of the ECG and audible with a standard stethoscope. *(Heart Sounds are discussed on page 198 of this User Guide.)*



The Cardiovascular View

Cardiovascular System			
Anatomy, Physiology, and Clinical Signs	**Clinical Interventions, Patient Monitoring and Scenarios**	**Software Control**	**Manual Control**
5-Lead ECG	ECG waveforms can be viewed on a standard monitor, the Patient Status Display and the TouchPro software. Normal and abnormal cardiac rhythms are linked to patient physiology (e.g., blood pressure, cardiac output).	None required, but specific rhythms can be selected. VIEW: **Cardiovascular** PARAMETER(S): **Cardiac Rhythm Override**	None required.
Baroreceptor Reflex	The cardiovascular system automatically compensates for changing hemodynamic conditions.	None required, but adjustable. VIEW: **Cardiovascular** PARAMETER(S): **All Baroreceptor Selections**	None required.
Cardiac Arrhythmias	The desired arrhythmia can be selected.	The response to clinical intervention must be controlled by the instructor. VIEW: **Cardiovascular** PARAMETER(S): **Cardiac Rhythm Override**	None required.
Cardiac Pacing	Transthoracic cardiac pacers can be used with the PediaSIM ECS. Pacing results in appropriate physiological changes in blood pressure and cardiac output.	The instructor can set the level at which electrical capture and mechanical capture occur. VIEW: **Cardiovascular** PARAMETER(S): **All Pacing Parameters**	See *Pacing* for cardiac pacing disk locations and instructions.
Chest Compression	Effective chest compression results in artificial circulation, cardiac output, central and peripheral blood pressures, palpable pulses and CO_2 return.	None required, but adjustable. VIEW: **Cardiovascular** PARAMETER(S): **Chest Compression Efficacy**	None required.
Circulation	Normal and abnormal circulation (e.g., hypovolemia, hypervolemia and right/left heart failure).	None required, but adjustable. VIEW: **Cardiovascular** PARAMETER(S): **Left Ventricle Contractility Factor and Right Ventricle Contractility Factor**	None required.
Defibrillation	The PediaSIM ECS supports operation with a variety of manual and automatic external defibrillators.	Defibrillation can be simulated by the instructor. VIEW: **Cardiovascular** PARAMETER(S): **Defibrillation**	See *Defibrillation* for defibrillation disk locations and instructions
Invasive Hemodynamic Monitoring	See the *Invasive Hemodynamic Monitoring* chart	None required, but adjustable. VIEW: **Cardiovascular** PARAMETER(S): **Multiple**	None required.
Manual Blood Pressure	Systemic blood pressure can be measured using the return-to-flow technique on the left arm. Korotkoff sounds can also be auscultated.	None required.	See *Manual Blood Pressure* for using the modified blood pressure cuff
Palpable Pulses	Carotid, radial, brachial, femoral and pedal pulses can be palpated bilaterally and are synchronous with the cardiac cycle. A pulse deficit automatically occurs if the systolic arterial blood pressure falls below specified thresholds. See the *Palpable Pulse Thresholds* chart	None required, but adjustable. VIEW: **All** PARAMETER(S): **Pulses**	None required.

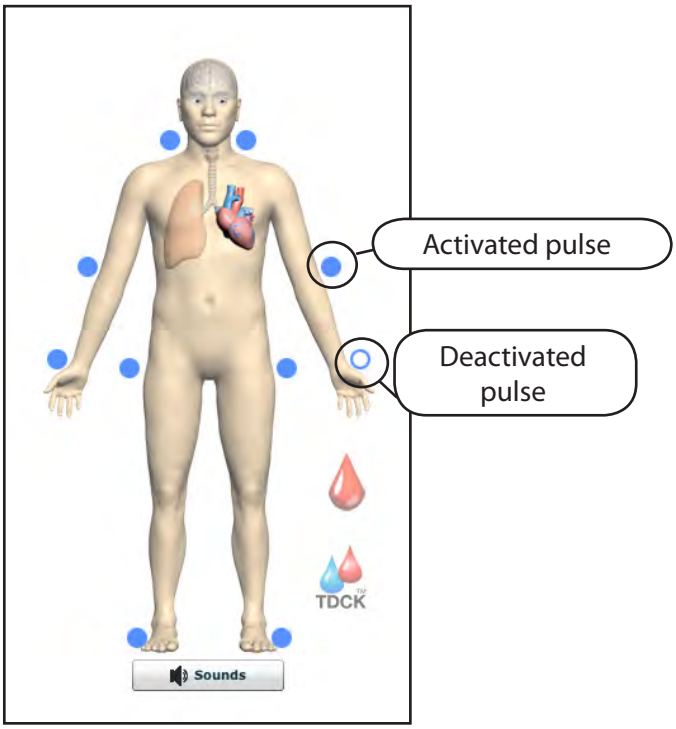
Pulses

The PediaSIM ECS has 10 pulse locations.

- Carotid (2)*
- Brachial (2)
- Radial (2)
- Femoral (2)
- Popliteal/Pedal (2)*

*Denotes that the pulses are controlled together.

Pulses are visible and can be controlled from any physiological view. All pulses, unless altered by an SCE, are enabled by default. To disable a pulse, click the pulse location on the human form. To enable a pulse, click the pulse location again.



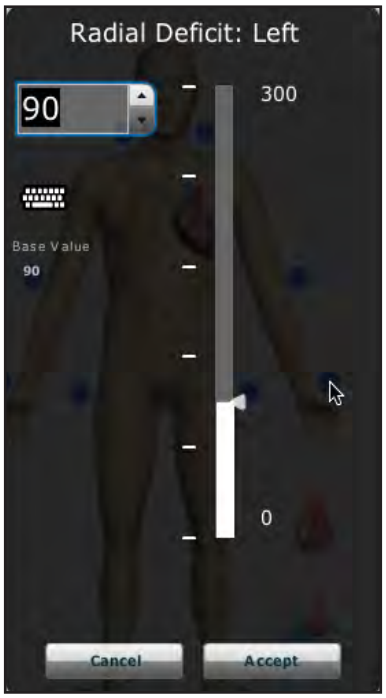
Pulses – Activated and Deactivated

Palpable Pulse Thresholds

A pulse deficit automatically occurs when the systolic arterial blood pressure falls below the following thresholds:

Palpable Pulse Thresholds	
Location	**Systolic Pressure Threshold**
Carotid	60 mmHg
Radial	90 mmHg
Brachial	70 mmHg
Femoral	80 mmHg
Popliteal/Pedal	80 mmHg

Click and hold a pulse location to adjust the pulse deficit. The pulse deficit parameter appears.



Pulse Deficit Parameter

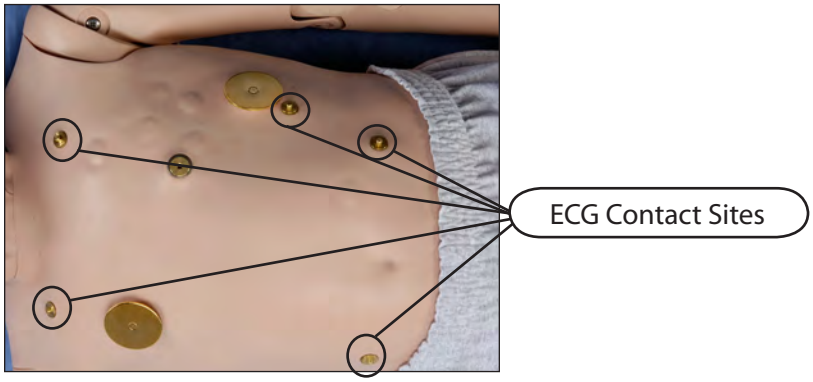
Invasive Hemodynamic Monitoring

The following parameters can be displayed on the Patient Status Display and TouchPro Software:

Invasive Hemodynamic Monitoring
Arterial Blood Pressure
Left Ventricular Pressure
Central Venous Pressure
Right Atrial Pressure
Right Ventricular Pressure
Pulmonary Artery Pressure
Pulmonary Artery Occlusion (Wedge) Pressure
Cardiac Output

ECG Signals

To produce ECG signals on a monitor, connect the five leads of a 5-lead unit to the contacts (or snaps) located on the mannequin.



ECG Contacts

Manual Blood Pressure

To use noninvasive blood pressure monitoring techniques (i.e., a blood pressure cuff) on the left arm, a standard pediatric cuff with the supplied T-fitting and adapters must be configured prior to use.

To configure a standard pediatric cuff for use with a PediaSIM ECS:

1. Cut the hose that connects to the pressure gauge on the cuff.

Cutting the Hose

2. Insert one of the supplied adapter fittings into each of the open ends of the tube, using a female fitting on one end and a male fitting on the remaining end.

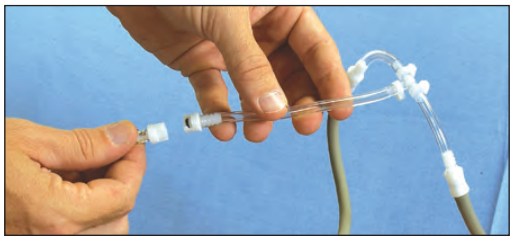
Inserting an Adapter Fitting

3. Attach the adapter cuff around the tubing to hold the adapter fitting into place.

4. Insert the T-fitting into the hose adapters, noting the male and female connections.

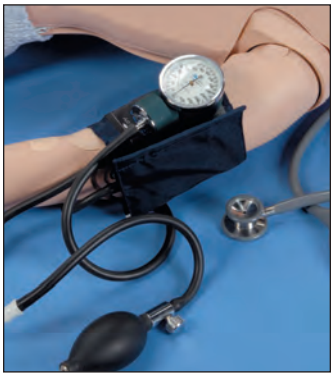
Inserting the T-fitting into the Hose Adapters

5. Connect the remaining portion of the T-fitting to the hose located on the mannequin's shoulder just behind the left arm.



Connecting the Remaining Portion of the T-fitting to the Hose

6. Attach the cuff to the upper left arm and take the noninvasive blood pressure reading using the return-to-flow technique.



An Adapted Blood Pressure Cuff

7. Store the modified blood pressure cuff with the PediaSIM ECS system for future reuse.

Korotkoff Usage

To use this feature:

1. Have the learner palpate the left brachial pulse to identify its presence or absence.
2. As the learner places the stethoscope in his or her ears, disable the left brachial pulse.
3. Allow the learner to auscultate the blood pressure, hearing the beginning of sounds at the systolic pressure and the absence of sounds indicating the diastolic pressure.
4. Next, enable the left brachial pulse.

Chest Compression

The patient mannequin supports normal hand placement and standard compression techniques. Set the mannequin on a safe and sturdy work surface when administering chest compressions.

Defibrillation

The PediaSIM ECS is designed to safely absorb the energy discharged from manual andautomatic defibrillators. However, use of a defibrillator for training purposes represents an operational hazard equivalent to use of a defibrillator on a real patient. Consequently, all safety precautions for use of defibrillators must be followed as if the mannequin were a patient. Consult the specific defibrillator's User Manual for further information.

The following cautions should be observed:

Defibrillation should be performed on the defibrillation electrodes only. If defibrillation is performed over any ECG or pacing electrode, high voltage may be present on the remaining connectors during the shock. This may also damage ECG and pacing circuitry.

To prevent overheating, do NOT provide more than three (3) defibrillator discharges (maximum 200 Joules) in a sequence. Do NOT exceed an average of two (2) defibrillator discharges per minute during the training session.

Do NOT let the mannequin come in contact with electrically conductive surfaces or objects during defibrillation. A flame-supporting atmosphere, for example, with a high content of oxygen, should be avoided during defibrillation.

Keep the mannequin chest dry. Special attention should be taken when using the urinary system or the chest tube feature.

To prevent pitting of the chest skin electrode, do NOT apply conductive gel or conductive defibrillation pads intended for patient use.

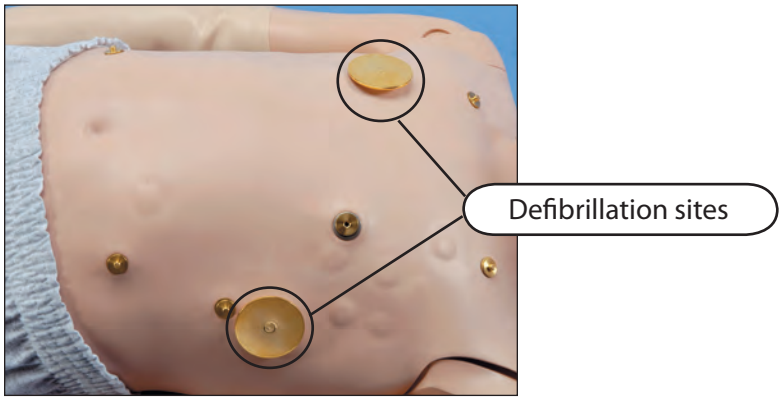
Do NOT use cables or connectors having visible damage.

Do NOT spill fluids over any component inside the mannequin torso. This could damage the system and may also present a possible hazard for the operator.

When using a manual defibrillator, the ECG can be monitored via the defibrillator paddles. Coarse ventricular fibrillation and high-rate ventricular tachycardia cardiac rhythms are automatically recognized as "shockable" rhythms.

With each defibrillation, the PediaSIM ECS automatically records the amount of energy discharged and the time defibrillation was performed. The simulated patient response to defibrillation is determined by the scenario script or instructor intervention. Thus, cardioversion is not automatically determined by the physiological models.

For paddle placement on the chest, the mannequin has two defibrillation disks, which can be unscrewed, leaving threaded connections, if required.



Defibrillation Disks

IMPORTANT: Do NOT allow defibrillator paddles to come in contact with pacing disks or ECG nodes. Defibrillating an ECG or pacing location will damage circuitry within the mannequin.

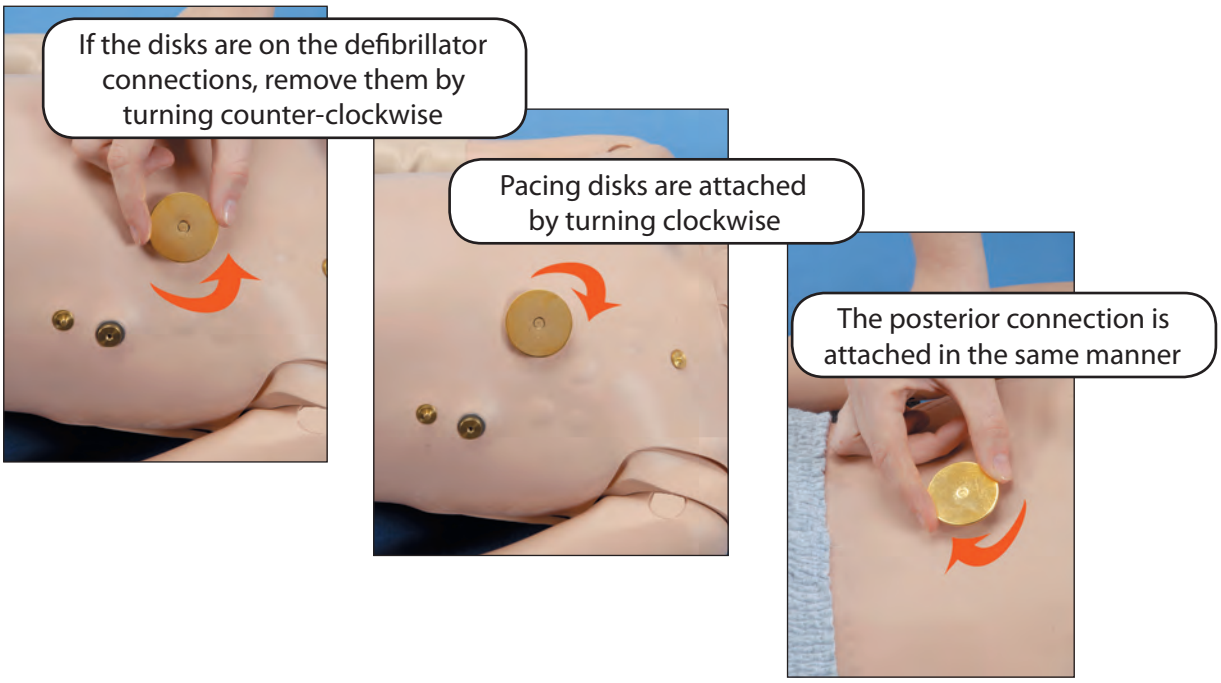
The PediaSIM ECS is compatible with a wide variety of manual and automatic external defibrillators. Defibrillators employing a monophasic waveform (as used by Physio-Control® equipment) automatically report the energy discharge (200 Joules). Defibrillators employing alternative waveforms (such as the bi-phasic waveform used by Zoli® equipment) DO NOT accurately report the energy discharge, although the mannequin safely absorbs the shock delivered.

Pacing

Disks on the front and back of the mannequin are used for cardiac pacing.

To use the pacing feature:

1. Make sure the metal pacing disks are attached to the mannequin.
2. Attach the pacing pads from a standard transthoracic cardiac pacer to the mannequin at the site of the pacing disks, placing the negative lead on the anterior location and the positive lead on the posterior location of the heart.


If the disks are on the defibrillator connections, remove them by turning counter-clockwise
Pacing disks are attached by turning clockwise
The posterior connection is attached in the same manner

Pacing Disks

The software automatically detects and responds to pacing signals.

Metabolic System

Arterial blood gases (ABGs), including pH, PCO_2 and PO_2, are physiologically modeled within the PediaSIM ECS system so that the results are made available on the Instructor Workstation and on the optional Remote Control. The ABG data displayed corresponds accurately and dynamically to the alveolar concentration of CO_2 and O_2. Metabolic acidosis and alkalosis are simulated with a few simple adjustments to the ABG pH level, and simple calibrations can accurately simulate a patient response to diabetic ketoacidosis.

Genitourinary System

The mannequin may be configured with either male or female genitalia, either of which allows for the insertion of a urinary catheter. The genitourinary system also provides for the excretion of urine.

Replacing the Mannequin's Genitalia

The PediaSIM ECS comes with interchangeable male and female genitalia.

To replace the mannequin's genitalia:

1. Detach the existing genitalia.
2. Attach the selected genitalia, ensuring it is secure in the grooves. The genitourinary features are now ready for use.

Utilizing the Genitourinary Features

To use the Genitourinary features:

1. Insert the genitalia desired for the exercise.
2. Set up an IV pole near the PCU.
3. Fill an IV bag and attach it to the supplied IV solution set to yield a clinically appropriate colored liquid (e.g., for simulated urine, add 1 to 2 mL of yellow food dye per liter of distilled and mix to achieve the desired color). Be careful not to make the mixture too thick, as this can clog the system.
4. Attach the IV solution set to the IV bag and make sure the blue roller clamp is closed.

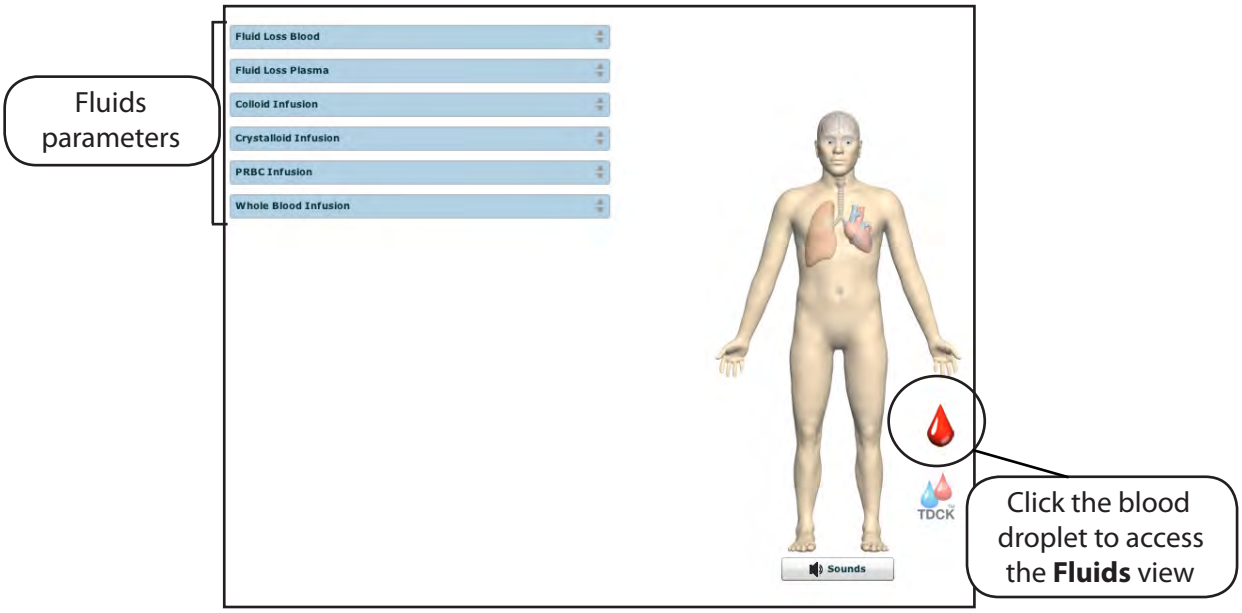
GU Source Bag

5. Hang the bag on the IV pole.
6. Connect to the mannequin by attaching the end of the IV solution set to the orange (GU source) hose in the Umbilical Assembly.
7. Catheterize the mannequin using a standard #10 urinary catheter lubricated with silicone spray.
8. Open the clamp and allow fluid to flow into the mannequin. There is a reservoir inside the mannequin that serves as a bladder and will fill up with the fluid.
9. When fluid begins to drip from the catheter, adjust the clamp to stop the flow.
10. Remove the catheter. The system is now primed and ready for use.
11. Adjust the flow rate manually using the clamp.

NOTE: Clean up is very important when using simulated fluids. *See the Care/Maintenance section of this User Guide for proper cleanup instructions.*

Fluids

The PediaSIM ECS can sustain IV medication and fluid administration.



The Fluids View

Fluids			
Anatomy, Physiology and Clinical Signs	**Clinical Interventions, Patient Monitoring and Scenarios**	**Software Control**	**Manual Control**
Intraosseous Site	Needle placement for IO infusion can be made and IV fluids infused into the anterior tibia of the right leg.	None required.	See *Intraosseous Site*

Intraosseous (IO) Site

The IO site is located on the anterior tibia of the right leg.

The IO Site

An IO needle can be used with a standard IV infusion set.

NOTE: Clean up is very important when using simulated fluids. *See the Care/Maintenance section of this User Guide for proper cleanup instructions.*

IV Arm Parts Replacement

To replace the IV Arm Skin:

1. Remove the used skin.
2. Sprinkle talcum powder into the interior of the new skin.
3. Shake out the excess powder and slide the new skin over the hand, pulling it into place over the arm.
4. Palpate the veins to verify they are positioned in the channel on the arm and hand.

To replace the veins:

1. Pull down the skin of the arm.
2. Remove the worn tubing section by cutting the tubing on each side of the affected area. Leave at least 1″ (2.5 cm) of the vein extending from the molded arm to ensure enough material in which to install butt connectors.
3. Insert one of the supplied butt connectors into each of the tubing ends.
4. Cut a new piece of tubing the same length as the one being replaced.
5. Install the new section by lubricating the butt connectors and sliding the new vein over them. Ensure the tubing fits all the way over the connectors.
6. Replace the skin.

NOTE: Clean up is very important when using simulated fluids. *See the Care/Maintenance section of this User Guide for proper cleanup instructions.*

Sounds

A variety of simulated sounds are available to enhance realism.

Wireless Microphone

A wireless microphone is available to provide phonation or a voice from the patient. To use the wireless microphone, attach the transmitter to a belt or pocket and snap the microphone to a lapel or shirt pocket.

Wireless Microphone

Verify that the two antennas located on the front of the wireless receiver on the PCU are extended and that the transmitter has been set to the same channel as the receiver on the PCU (the default setting).

Switch the receiver and the microphone to the **ON** position.

Adjust the volume using either the volume setting on the receiver (on the PCU) or with the **Microphone Volume** on the software. To access the **Microphone Volume**, click the **Sounds** button from the Run screen, and click **Microphone Volume** from the Sounds panel. Adjust the slider to the desired volume.

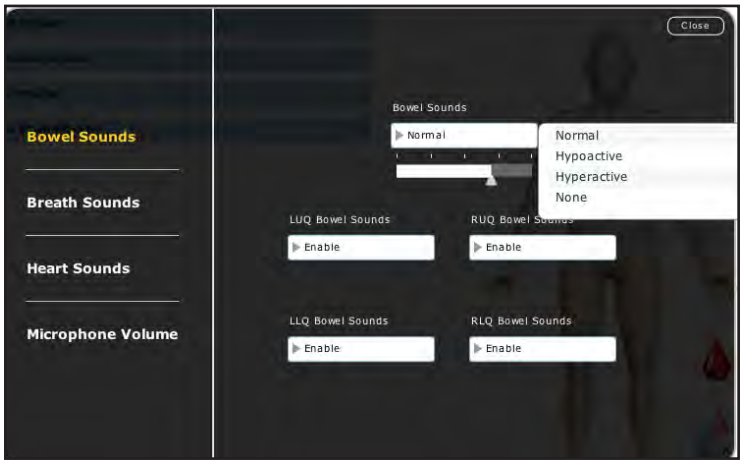
The Microphone Volume Control

The receiver and transmitter are factory-configured to the same channel. However, if they need to be reset (e.g., when multiple simulators are in use), adjust the frequencies using the Group and Channel settings on the microphone and receiver with a small screwdriver. These settings must be identical. Detailed instructions are shipped with the microphone.

The wireless microphone transmits over user-selectable frequencies of between 790 and 806 MHz at 10 mW, a range legally appropriate for the United States and most international sites.

Bowel Sounds

Learners can auscultate bowel sounds over each of four intestinal quadrants: the Upper Right, Upper Left, Lower Right and Lower Left. The sounds can be independently set in each anatomical region to **Normal**, **Hypoactive**, **Hyperactive** or **None** (bowel sounds are absent).



The Bowel Sounds Menu

Bowel sounds can be adjusted by clicking the **Sounds** button on the Run screen. When the Sounds panel appears, select **Bowel Sounds**.

Click any one of the **Bowel Sounds** drop-down menus that controls one of four quadrants to change the type of sound.

Click and drag the slider for each location to adjust the volume.

Normal bowel sounds are present by default.

NOTE: A patient must be running on the PediaSIM ECS simulator for any sounds to be available.

Breath Sounds

Breath sounds are independently synchronized with ventilation of the left and right lungs. Speakers in the anterior and posterior regions provide breath sounds that can be auscultated.

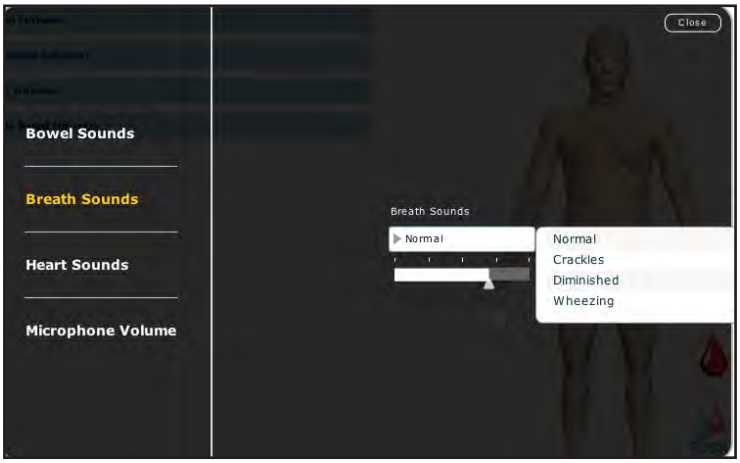
Breath sounds can be adjusted by clicking the **Sounds** button on the Run screen. When the Sounds panel appears, select **Breath Sounds**.

Breath Sounds
Normal
Crackles
Diminished
Wheezing

Click any one of the **Breath Sounds** in the drop-down menu to select a Breath Sound. Click and drag the slider for each location to adjust the volume.

NOTE: A patient must be running on the PediaSIM ECS simulator for any sounds to be available.

By default, **Normal** breath sounds are heard.



The Breath Sounds Menu

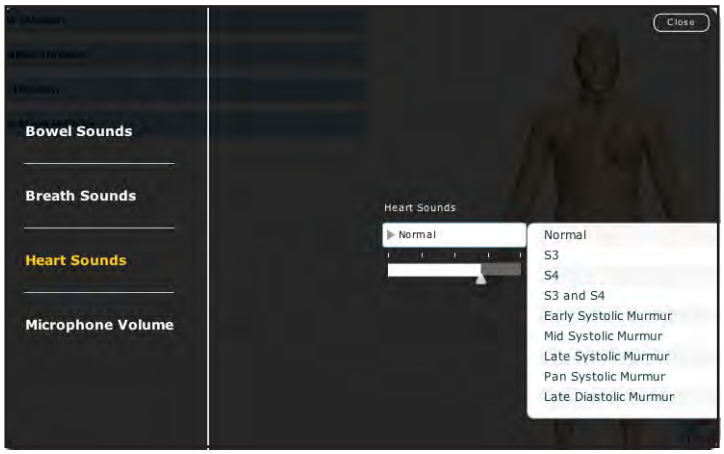
Heart Sounds

Heart sounds emanate from speakers and are synchronized with the cardiac cycle. Heart sounds can be auscultated over the left and right sternal border, right lower sternal border and apex.

By default, heart sounds are set to **Normal**. The following sounds are available:

Heart Sounds
Normal
S3
S4
S3 and S4
Early Systolic Murmur
Mid Systolic Murmur
Late Systolic Murmur
Pan Systolic Murmur
Late Diastolic Murmur

Heart sounds can be adjusted by clicking the **Sounds** button on the Run screen. When the Sounds panel appears, select **Heart Sounds**.



The Heart Sounds Menu

Click the **Heart Sounds** drop-down menu to change the type of sound. Click and drag the slider to adjust the volume.

NOTE: A patient must be running on the PediaSIM ECS simulator for any sounds to be available.

PediaSIM ECS Care and Maintenance

Maintaining the PediaSIM ECS requires careful treatment of the electronic and mechanical components. Each time the PediaSIM ECS system is assembled or disassembled, make sure all components are properly handled and either removed from or placed into storage correctly.

PediaSIM ECS Warranty Programs

General Information

CAE Healthcare patient simulator products come with a one-year Basic Service Warranty at no additional charge. All warranties begin at date of shipment or CAE Healthcare installation. You may upgrade your first year Basic Service Warranty to an Enhanced Warranty and receive remedial and preventive maintenance. To prevent equipment downtime and delays after your warranty expires, we encourage you to contract for extended maintenance services for all subsequent years.

Units Out of Agreement

For units no longer under warranty requiring repairs, the Time and Materials service plan will apply (see **Time and Materials** section below).

To place an out-of-warranty unit under a warranty contract, CAE Healthcare reserves the right to have the patient simulator inspected by a CAE Healthcare-approved technician at the customer's expense. If necessary, the unit would have to be repaired at the customer's expense prior to issuance of a warranty contract.

The repairs required, as the result of the examination, will be quoted on a time and material basis.

How to Contact Customer Service

CAE Healthcare Customer Service Headquarters - United States and Latin America
Monday - Friday from 7:00 a.m. to 6:00 p.m. ET
Toll Free +1 (866) 462-7920
24-hour Hotline +1 (941) 342-5605
Fax +1 (941) 342-5600
Email Address: customerservice@caehealthcare.com
Web URL: www.caehealthcare.com

CAE Healthcare Customer Service - Canada
Monday - Friday from 8:00 a.m. to 5:00 p.m. ET
Toll Free +1 (877) 223-6273
Email Address: can.service@caehealthcare.com

CAE Healthcare Customer Service - Europe, Middle East and Africa (EMEA)
Monday - Friday from 8:00 a.m. to 5:00 p.m. CET
Phone +49 (0) 6131 4950354
Fax +49 (0) 6131 4950351
Email Address: international.service@caehealthcare.com

CAE Healthcare Customer Service - UK and Ireland
Monday - Friday from 9:00 a.m. to 5:00 p.m. GMT
Phone +44 (0)800-917-1851
Email Address: uk.service@caehealthcare.com

Principal hours of operation exclude holiday and non-business days.

Contract Period

Warranty contracts are not ordinarily offered for periods of less than one year. However, multiple-year warranty contracts may be arranged for up to an additional three years. Discounts are available for purchase of multiple year contracts.

Limitations of Agreement

Your exclusive remedy for any defective patient simulator is limited to the repair or replacement of the defective patient simulator.

CAE Healthcare may elect which remedy or combination of remedies to provide at its sole discretion. CAE Healthcare shall have a reasonable time after determining that a defective product exists to repair or replace defective product. CAE Healthcare's replacement product will be manufactured from new and/or serviceable parts. CAE Healthcare's agreement applies to repaired or replaced products for the balance of the applicable period of the original warranty or ninety days from the date of shipment of a repaired or replaced product, whichever is longer.

CAE Healthcare shall not be liable under this warranty for incidental or consequential damages, or in the event of any unauthorized repairs or modifications have been made or attempted, or when the product, or any part thereof, has been damaged by accident, misuse or abuse. This warranty does not cover normal wear and tear, staining, discoloration or other cosmetic irregularities that do not impede or degrade product performance. Any damage or malfunction as a result of the installation of software or hardware, not authorized by CAE Healthcare, will be repaired under the Time and Materials service plan (see **Time and Materials** section below).

CAE Healthcare's warranty does not cover products that have been received improperly packaged, altered or physically damaged. Products will be inspected upon receipt.

Some states in the USA do not allow the exclusion or limitations of incidental or consequential damages, so the limitations above may not apply to you. This warranty gives you specific legal rights and you may also have other rights, which vary from state to state.

Return Materials Authorization (RMA)

No product may be returned directly to CAE Healthcare without first contacting CAE Healthcare for an RMA number. If it is determined that the product may be defective, you will be given an RMA number and instructions for product return. An unauthorized return, i.e. one for which an RMA number has not been issued, will be returned at your expense. Authorized shipments are to be shipped prepaid to the address on the RMA. Your original box and packaging materials should be kept for storing or shipping your product. To request an RMA, please contact Customer Service.

Basic Warranty Service Program

The CAE Healthcare patient simulator comes with a one-year Basic Warranty Service Program. The Basic Warranty Service Program provides return-to-factory hardware and software maintenance. Basic service provides corrective maintenance support for the timely repair or replacement of CAE Healthcare products. CAE Healthcare may either repair or replace failed components. The Basic Warranty Service option includes:

- Labor and materials for the repair of products at CAE Healthcare's facility
- Timely replacement of faulty modules/sub-modules
- Software upgrade services (see **System Software Upgrades Support** section)
- Basic application support
- Customer Service Hotline (telephone, fax and e-mail)
- On-site repair provided at CAE Healthcare discretion
- Freight costs to the CAE Healthcare center are not covered. However, CAE Healthcare bears the return freight costs utilizing a standard delivery service selected by CAE Healthcare
- CAE Healthcare assumes the responsibility for loss or damage of goods in CAE Healthcare's Sarasota Facility during maintenance or service

Enhanced Warranty Service Program

The Enhanced Warranty Service Program provides the same features as the Basic Warranty Service Program with the addition of Preventive Maintenance (PM) of CAE Healthcare products. PM takes place at CAE Healthcare's facility and is performed once per year. Freight costs to and from the customer site, shipped by standard ground transportation, are paid by CAE Healthcare. Preventive Maintenance consists of the following:

- Physical inspection and cleaning
- Functional check of equipment
- Lung calibration

System Software Upgrade Support

Customers with current warranty contracts are entitled to receive upgrades to applications software previously purchased. Installation of the system software is the user's responsibility.

The System Software Upgrades Support includes software upgrades for base software and purchased optional software modules.

This does not apply for major upgrades or technological enhancements.*

Pricing Structure

Time and Materials

For those institutions not under agreement, service will be provided as required on a Time and Material basis:

Description	In-House	On-Site
Technical Support	As quoted at time of repair	CAE Healthcare's prevailing labor rate with a minimum of four hours labor
Material	As quoted at time of repair	As quoted at time of repair
Travel	N/A	Priced at CAE Healthcare's fully burdened cost plus fee

Principal period of on-site support (customer's local time) is:

- Monday through Friday, 8:00 AM to 5:00 PM (customer's time zone)
- Holiday and non-business days excluded
- Support outside the principle period is billed at the premium rate (hourly rate x 1.5)

A minimum of 48 hours notice is required for scheduling an on-site support call. Urgent on-site support with less that 48 hours notice will be charged at the premium hourly rate.

On-site time is described as the time period commencing from arrival at customer site through departure from customer site.

Breakdown

After each use, the PediaSIM ECS should be properly disassembled, cleaned and stored in a secure place. To ensure the PediaSIM ECS remains in good working condition, follow the prescribed CAE Healthcare breakdown procedures below. These procedures are estimated to take less than 30 minutes.

The table below outlines the steps required for disassembling, cleaning and storing the PediaSIM ECS system.

	Breakdown Steps
1	Clean Systems
1a	Flush the Genitourinary (GU) System
1b	Flush the IV System
1c	Flush the Chest Tube System
1d	Decompress the Chest
1e	Wipe Off the Mannequin
2	Turn the Air and Gas Supplies Off
3	Shut Down the Software
4	Disconnect the Computer Components
5	Shut Down the PCU
6	Disconnect the Hoses and Cables from the PCU
7	Ready the PCU for Storage
8	Disconnect the Umbilical from the Mannequin
9	Store the Mannequin

Further details for each of these steps are included in the pages that follow.

Step 1: Clean Systems

To maintain the PediaSIM ECS in top condition, thoroughly clean the outside and flush those systems that were used during the session.

A. Flush the Genitourinary (GU) System

If colored distilled water was used during the simulation exercise, flush the system with at least 200 mL of distilled water.

To flush the GU system:

1. Replace the GU source IV bag with a 1-liter IV bag of distilled water.
2. Prime the bulb of the IV solution set and ensure flow has started.
3. Run the IV supply with distilled water until approximately 200 mL has infused and clear fluid is flowing into the drainage bag.
4. Close the clamp on the GU source IV bag.
5. Remove the IV bag and disconnect the set from the GU source on the Umbilical Assembly.
6. Connect a large (e.g., 60-mL) syringe filled with air to the orange hose (the GU source) of the Umbilical Assembly.
7. Using the syringe, force the air through the system until no water remains in the system.
8. Disconnect and drain the urine collection bag.
9. After the flushing procedure is completed, ensure the mannequin's skin is clean and dry.

To prevent mold, mildew and fungus from fouling the GU, occasionally flush the GU system with a 200 mL IV bag of distilled water mixed with 20 mL of bleach. Follow the procedure outlined above for flushing the system first using the bleach solution. Repeat the procedure using distilled water only. The system should be cleaned in this way about once every two months (or as appropriate).

B. Flush the IV System

To flush the right arm IV site:

1. Remove the IV source bag from the red hose in the Umbilical Assembly.
2. IF COLORED WATER WAS USED, fill a 60-mL syringe with fresh, distilled water.
3. Insert the tip of the syringe into the red hose.
4. Inject all the water from the syringe into the hose and let it collect in the drain bag attached to the blue hose.
5. Continue to inject water until the water flowing into the bag is clear.
6. Refill the syringe with air and force the air through the hose until no moisture exists.

To flush the jugular or femoral IV sites, inject air into the IV line until no moisture is present.

C. Flush the Chest Tube System

To flush the Chest Tube system:

1. Disconnect the Trauma source bag from the white hose in the Umbilical Assembly.
2. Lubricate a priming tube (if a chest tube is not already present) with silicone spray.
3. Push the priming tube into the insertion site on the right side (if a chest tube is not already present) far enough to engage the valve and allow the water to drain out.
4. IF COLORED WATER WAS USED, fill a 60-mL syringe with fresh, distilled water.
5. Insert the tip of the syringe into the end of the white hose.
6. Inject all the water from the syringe into the hose and let it drain out through the tube.
7. Repeat this process until the water draining through the tube is clear.
8. Fill the syringe with air and, inserting the syringe into the white hose, force the air through the system until no water drains from the tube.
9. Remove the tube.
10. Repeat this process on the left side.

D. Decompress the Chest

Always decompress the chest when using the Pneumothorax Needle Decompression feature before completing the shutdown procedures. Do not store the mannequin until decompression has been performed. *For details on needle decompression, see page 179*.

E. Wipe Off the Mannequin

After all fluids have been removed, carefully inspect the mannequin for evidence of any remaining colored liquids. If a stain is found, use a soft cloth with mild soap to wash the area. Rinse and dry. Once the mannequin is thoroughly flushed and cleaned, it is ready for storage.

Step 2: Turn the Air and Gas Supplies Off

The next step in the breakdown process is to turn off any air or gas supply in use.

Turn off Air Supply

If air was used:

Shut off the air supply (i.e., the central air supply resource)

or

Turn off the OPTIONAL Air Compressor, drain any air in the tank and store the Compressor. The Quiet In-Room Air Compressor is drained using a valve on the bottom of the unit. Open the valve to drain. Be sure to close the valve after the procedure has been completed.

Turn off Gas Supply

If CO_2 was used:

Close the CO_2 supply using the supplied wrench to tighten the valve, and properly store the tank.

Once the air and gas supplies have been turned off, remove the Regulator Assembly from the CO_2 source, coil the assembly and set it aside for storage.

Step 3: Shut Down the Software

Shut down any optional TouchPro computers, optional Wireless Remote Controls and Müse software.

To shut down the Müse software on the Instructor Workstation:

a. In the Müse software, click the **Disconnect** icon on the Run screen.
b. Stop any running SCEs. The Stop Simulation dialog box appears.
c. Click the **Stop Simulation** button. The Simulation stops and returns to the Home page.
d. Click the Account Name in the lower, right-hand corner of the screen. The Logout dialog box appears.
e. Click **Logout** to exit the software.
f. Disconnect the Instructor Workstation from the PCU.

To shut down the TouchPro software (optional):

a. Click the **Settings** button in the bottom, right-hand corner of the TouchPro screen.
b. From the Settings menu, click **Shutdown**. A warning box appears asking if you want to exit.
c. Click **Shutdown**.

If using a Wireless Remote Control, quit the Müse application using the same steps described above for the Instructor Workstation.

Step 4: Disconnect the Computer Components

To disconnect and store the computer components:

a. If using the optional TouchPro computer, shut down the computer.
b. Power off the Instructor Workstation by selecting the **Shutdown** option beneath the menu on the Finder menu bar.
c. Unplug the Instructor Workstation and the optional TouchPro computer power cables from the outlet.
d. Disconnect the Ethernet cable from the Instructor Workstation.
e. Disconnect the power supply cable from the Instructor Workstation.
f. Coil the cords and store them along with the Instructor Workstation.

NOTE: If using the battery to power the Instructor Workstation or if using the Wireless Remote Control, recharge the battery using the power cable and a surge-protected power source.

Step 5: Shut Down the PCU

With the air and gas supplies turned off (from Step 2):

a. Power off the PCU by pressing the **POWER SWITCH** on the Interface Panel into the OFF position.
b. Unplug the power cord from the power outlet. (If using the OPTIONAL Auxiliary Power Supply, disconnect the cable from the Auxiliary Power Supply.)
c. Remove the power cord from the **PCU** port labeled **AC IN**. (If using the OPTIONAL Auxiliary Power Supply, remove the cable from the port labeled **AUX POWER IN 12VDC**.)
d. Coil and set aside the power cord.

If using the Auxiliary Power Supply, recharge the internal battery by plugging the component into an AC power outlet when one becomes available.

Step 6: Disconnect the Hoses and Cables from the PCU

To disconnect the PCU's hoses and cables:

a. Disconnect the EXPIRED CO_2 hose from the PCU.
b. Disconnect the MAIN SUPPLY GAS AIR-OR-CO_2 hose from the PCU.
c. Disconnect the Fluidic/Pneumatic Coupler from the lower **UMBILICAL** port.
d. Disconnect the Electrical cable from the upper **UMBILICAL** port.
e. Disconnect the Ethernet cable from the **INSTRUCTOR WORK STATION** port.
f. Coil the hoses and cables and set them aside to be stored.

Step 7: Ready the PCU for Storage

Once all of the hoses and cables are disconnected from the PCU Interface Panel, fold the Wireless Receiver antennas back into position and close the PCU door. Lock the clamps on all three sides of the PCU into place to ensure the safety of the equipment.

The Wireless Microphone can be stored in the PCU case, but before storing the microphone, be sure the transmitter has been turned off to maintain battery power for the next session.

Step 8: Disconnect the Umbilical from the Mannequin

To disconnect the Umbilical Assembly from the mannequin,

a. Unlock the fluid/pneumatic hose system by sliding the red lever.
b. Disconnect the electrical cable by twisting the outer fitting.
c. Wind the umbilical carefully and set it aside to prepare it for storage.

Step 9: Store the Mannequin

Place the mannequin in the mannequin case for storage, using the foam inserts to hold it in place. Use any remaining room in the case for clinical supplies and other teaching tools used in the next session.

Maintenance Advice

Simple care and maintenance helps to ensure that the PediaSIM ECS system stays in good working condition. Many problems are caused by inadequate or improper maintenance. Perform a thorough check of the various components each time the simulator is used.

General Mannequin Care

- Avoid the use of writing instruments and sharp objects near the patient mannequin to prevent unattractive markings on or tears in the skin.
- Lubricate airway adjuncts with silicone spray (and NOT a water-based lubricant) prior to insertion into the airway.
- A mild detergent and warm water will remove most marks and stains. Gently rub the soiled area with a soft cloth. Do NOT use ABRASIVE soaps or pads.
- Prior to using moulage of any kind, CAE Healthcare suggests the application of a very light coating of petroleum jelly, followed by a light dusting of baby powder, to the mannequin's skin. This application makes cleaning the skin easier.
- If any of the trauma, genitourinary or IV features of the PediaSIM ECS have been used, flush out the mannequin as described in the previous pages. Failure to flush the systems may cause problems for the system during attempts at future use.
- Store the mannequin in the optional case for storage and transport.
- Do NOT stack items on top of the mannequin case.

Airway Inspection

The PediaSIM ECS is equipped with an anatomically accurate airway that supports the practice of difficult airway management techniques. In the process of performing these techniques improperly or aggressively, the upper airway can be damaged. While such damage may be readily apparent (manifested as a leak in the breathing circuit) during mechanical ventilation, it may not be obvious during spontaneous or bag-mask ventilation.

Because damage can occur, occasional visual inspection of the airway is recommended. Using the light of a laryngoscope blade or a flashlight, visually examine both the upper and lower airway. While tears in the upper airway resulting from intubation may be obvious, needle holes in the lower bronchus resulting from techniques such as transtracheal jet ventilation may not be readily apparent.

If damage to the airway is found, small cuts or tears may be reparable. However, for permanent repair of damaged mannequins, contact CAE Healthcare Customer Service.

IMPORTANT: Always use the silicone spray to lubricate airway devices before insertion.

Needle Decompression Plug

The rubber plug used for needle insertion may become dislodged when removing the needle. To secure the plug, place a small strip of red tape over the plug to hold it in place. This tape can be punctured multiple times before placement.

Care of Electronic Equipment

- Do NOT use any of the computer components associated with this system for any other use.
- Do NOT connect the computer components to any network of any kind.
- Install any CAE Healthcare software updates as soon as they become available.
- NEVER stack other equipment on computer components or the PCU.

Recommended Clinical Supply Sizes

The following clinical supply sizes are recommended for use with the simulator. Other sizes may cause damage and should not be used.

Clinical Supply	Recommended Size
Urinary Catheter	10 Fr
Nasogastric Tube	10 Fr**
ETT	5 mm uncuffed
LMA Unique	#2
Oropharyngeal Airway	60 mm
Nasal-Pharyngeal Airway	24 Fr 6 mm
Tracheostomy Tube	3.5 mm
IV Cannula	20 to 22 gauge
Chest Tube	20 Fr
Needle Decompression	14 gauge 6 cm

**Insertion only

Condition Guidelines for Programming PediaSIM ECS with Müse

This card is intended to help you select Müse conditions to achieve desired vital signs within each programmed state. All four conditions should be programmed into each state in the order presented below.

Respiratory: Desaturation

Cardiovascular: Blood Pressure

Cardiovascular: Heart Rate

Respiratory: Respiratory Rate

The Müse software is physiologically driven. When using multiple conditions (e.g., Desaturation + Hypertension + Tachycardia + Tachypnea), physiological regulatory mechanisms such as the baroreceptor reflex and ventilatory control cause compensatory changes within parameters.o achieve the desired vital sign, select one condition level above (greater) or below (less) to achieve the desired physiological effect.

Respiratory: Desaturation

Desaturation	SpO_2 Value
Reset	98%
High 90s	96-97%
Mid 90s	94-95%
Low 90s	90-93%
High 80s	87-89%
Mid 80s	84-86%
Low 80s	80-83%
High 70s	77-79%
Mid 70s	74-76%
Low 70s	70-73%
Less than 70	<69%

Cardiovascular: Blood Pressure

Hypertension		Hypotension	
Reset	100s/60s	Reset	100s/60s
Increased	110s/70s	Decreased	90s/60s
Pre-Borderline	120s/70s	Pre-Borderline	80s/50s
Borderline	130s/80s	Borderline	70s/40s
Mild	140s/80s	Mild	60s/40s
Severe	150s/90s	Severe	50s/30s

Cardiovascular: Heart Rate

Tachycardia	
Reset	100s
Increased	110s
Elevated	120s
Pre-Borderline	130s
Borderline	140s
Intermediate	150s
Mild	160s
Severe	180s
Profound	190s
Acute	200s

Bradycardia	
Reset	100s
Decreased	90s
Pre-Borderline	80s
Borderline	70s
Moderate	60s
Severe	50s
Acute	40s

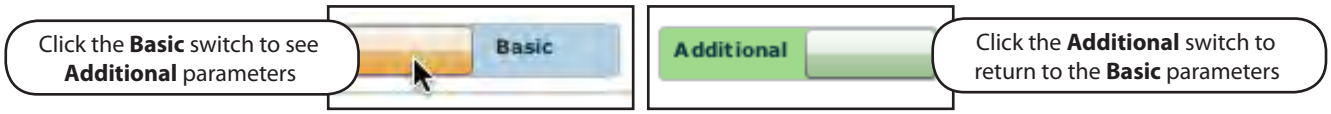
Respiratory: Respiratory Rate

Tachypnea	
Reset	22
Increased	25
Pre-Borderline	28
Borderline	30
Intermediate	33
Moderate	36
Severe	40

Bradypnea	
Reset	22
Decreased	20
Pre-Borderline	18
Borderline	16
Intermediate	14
Mild	12
Moderate	10
Severe	8
Profound	6
Extreme	4 - 5

Appendix A – Müse Parameter Descriptions

The Müse software has a number of parameters that control the physiological features of the PediaSIM ECS. The parameters are grouped by category: Neurological, Respiratory, Cardiovascular, Fluids and Sounds. Each screen lists the Basic parameters by default. However, when the **Basic/Additional** switch is activated, additional parameters become available.


Click the **Basic** switch to see **Additional** parameters
Basic
Additional
Click the **Additional** switch to return to the **Basic** parameters

The Basic/Additional Switch

The following is a brief description of each parameter. Each parameter description lists the default settings for the Andy Stevenson and Emily Liu patients as well as the ranges, if available, for all patients.

Neurological

The PediaSIM ECS can simulate a variety of neurological clinical indicators, such as secretions and reactive eyes.

Neurological Parameters
Eyes: Blink Speed
NMB
Temperature: Body
Temperature: Blood

Eyes

Each eye has eyelids that blink and close.

Eyes: Blinking

In **Auto** mode, the eyelids are normally blinking under the following conditions: Minute Ventilation is greater than 1500 mL, SpO_2 is greater than 70% and neuromuscular blockade (NMB) is less than 30%.

The **Blinking** and **Closed** settings allow the user to have one or both eyes either blinking or closed and override the automatic response.

Default: Auto

The **Slow**, **Normal** and **Fast** parameters control the eyelid blinking frequency. Presently, blinking frequency is not linked to the physiological models. However, the response can be done "on the fly" or scripted using the Scenario Designer.

Default: Normal

Neuromuscular Blockade (NMB)

The pharmacokinetic and pharmacodynamic models based on the neuromuscular blocking agents administered and the time course of their injection automatically determines the degree of NMB. For some educational applications, however, the instructor may wish to set a fixed degree of neuromuscular blockade that remains stable for an indefinite period. This can be accomplished using the **NMB** parameter. The default setting instructs the pharmacologic models to determine the degree of neuromuscular blockade based upon the drugs injected and their pharmacologic properties.

When a positive numeric value is assigned to this parameter, the degree of NMB is set to that level. For example, 80% NMB causes the simulator to set the degree of NMB to 80%, regardless of the presence (or absence) of neuromuscular blocking drugs. Clinically, the spontaneous tidal volume is markedly reduced.

Default: Modeled

Range: 0% - 100%

Temperature: Body

The temperature measured at the body surface can be set using this parameter and can be displayed on the Patient Status Display and TouchPro software.

The body temperature is not linked to the physiologic models. However, changes can be made "on the fly" or scripted using the Scenario Designer.

Default: 36.5° C

Range: 32.0° C - 42.0° C

Temperature: Blood

The arterial blood temperature can be set using the **Temperature: Blood** parameter. The arterial blood temperature can then be displayed on the Patient Status Display and TouchPro software. Note that changes in arterial temperature may alter the shape of the standard oxyhemoglobin dissociation curve. As temperature increases or pH decreases, more oxygen is released from hemoglobin and thus the patient's saturation decreases. The inverse is also true.

Default: 37° C

Range: 32.0° C - 42.0° C

Respiratory – Basic Parameters

Respiratory Parameters – Basic
Swollen Tongue
Airway Occluder
Laryngospasm
Needle Decompression (Left and Right)
Bronchial Occlusion
Respiratory Rate
Respiratory Rate Factor
Shunt Fraction
SpO_2
NMB
Tidal Volume
Intrapleural Volume: Left Intrapleural Volume: Right
Fraction of Inspired O_2

Swollen Tongue

This parameter is used to create two degrees of tongue swelling: **Semi-Swollen** and **Swollen**. The **Not Swollen** setting returns the tongue to its normal anatomic state.

Default: Not Swollen

Range: Not Swollen, Semi-Swollen and Swollen

Airway Occluder

Using the **Airway Occluder** parameter, swelling of the posterior oropharynx can be activated to obstruct the view of the larynx and prevent intubation but allow mask ventilation of the patient's lungs, thereby creating a "cannot intubate, can ventilate" scenario.

Default: Off

Laryngospasm

Use the **Laryngospasm** parameter to simulate a laryngospasm. A laryngospasm actuator closes the patient's vocal cords and prevents both ventilation and intubation. When activated with the **Airway Occluder** parameter, a "cannot ventilate, cannot intubate" crisis scenario is achieved.

Default: Off

Needle Decompression (Left and Right)

The **Needle Decompression** parameter is used to activate the **Needle Decompression** hardware in the simulator to relieve a pneumothorax in the simulator. This causes a rush of air to be heard on successful decompression. The amount of decompression is automatically subtracted from the **Intrapleural Volume** set.

Default: Off

NOTE: The **Chest Tube** and **Needle Decompression** features cannot be enabled simultaneously.

Bronchial Occlusion

Turning on the **Bronchial Occlusion** parameter completely obstructs the right or left bronchi, simulating a lower airway obstruction (e.g., mucus plug). Improper intubation creates a main-stem occlusion, yielding an inability to ventilate the lungs. However, the right and left bronchi are not occluded individually.

Default: Off

Respiratory Rate

The **Respiratory Rate** parameter is used to set the respiratory rate to a given number of breaths per minute. Once set, arterial oxygen and carbon dioxide values have no effect on the resulting respiratory rate, but continue to influence other components of the physiological models. The patient continues to breathe at the set number of breaths-per-minute, regardless of the arterial oxygen or carbon dioxide levels.

For example, when the respiratory rate is set to 10 breaths per minute, the respiratory rate remains at 10 breaths per minute, regardless of arterial oxygen or carbon dioxide levels. In such situations, the patient can only respond to arterial oxygen or carbon dioxide levels by adjusting the **Tidal Volume** parameter.

Default: Modeled

Range: 4 breaths per minute - 40 breaths per minute

Respiratory Rate Factor

The **Respiratory Rate Factor** parameter (along with the **Tidal Volume Factor** parameter) is used to change the baseline respiratory rate (before the control-of-breathing and drug influences are taken into account.) A value of 2 doubles the baseline respiratory rate. A value of 0.5 decreases the baseline respiratory rate by 50%.

Default: 1

Range: 0.01 - 6.00

TIP: First decrease the respiratory gain factor to reduce the influence of the respiratory control mechanism on the respiratory rate and tidal volume.

Shunt Fraction

The **Shunt Fraction** parameter is frequently used to assist in desaturating a patient. This parameter creates a physiologic "bypass" of the normal pulmonary circulation, resulting in changes in O_2, CO_2 and anesthetic gases at the alveolar level. Typically, values of 0.1 to 0.4 are needed to create large alveolar-arterial oxygen gradients sufficient to cause arterial hypoxemia.

Default: 0.02

Range: 0.00 - 0.50

TIP: If the parameter is set high (0.5), the patient desaturates rapidly and responds to the administration of supplemental O_2.

SpO_2

The SpO_2 parameter is used to override the normal pulmonary circulation and set the SpO_2 at a fixed numeric value, regardless of the oxygen applied. Resetting to **Modeled** returns control of the underlying SpO_2 to the physiological models.

Default: Modeled

Range: 0% - 100%

Neuromuscular Blockade (NMB)

The degree of NMB is automatically determined by pharmacokinetic and pharmacodynamic models, which are based on the neuromuscular blocking agents administered and the time course of their injection. For some educational applications, however, the instructor may wish to set a fixed degree of neuromuscular blockade that remains stable for an indefinite period. This can be accomplished using the **NMB** parameter. The default value instructs the pharmacologic models to determine the degree of neuromuscular blockade based on the drugs injected and their pharmacologic properties.

When a positive numeric any other positive value is assigned to this parameter, the degree of NMB is set to that level. For example, 80% NMB causes the simulator to set the degree of NMB to 80%, regardless of the presence (or absence) of neuromuscular blocking drugs. Clinically, the spontaneous tidal volume is markedly reduced.

Default: Modeled

Range: 0% - 100%

Tidal Volume

The **Tidal Volume** parameter is used to set the tidal volume to a given volume per breath. Once Tidal Volume is set to a numeric value, arterial oxygen and carbon dioxide values have no effect on the tidal volume, but continue to influence other components of the physiological models.

For example, with the tidal volume set to 600 mL in the adult simulator, the tidal volume remains a constant (set) 600 mL even in the event of falling arterial oxygen levels. In such situations, the patient can only respond to arterial oxygen or carbon dioxide levels when the respiratory rate is adjusted

Default: Modeled

Range: 0 mL- 2500 mL

Intrapleural Volume (Vol): (Left and Right)

The **Intrapleural Vol** parameters allow intrapleural volume to accumulate, for example, as happens during pneumothorax, hydrothorax or hemothorax.

To simulate a pneumothorax, set the corresponding **Intrapleural Vol** to a value greater than 0 mL. Values more than 1500 mL reduce the corresponding lung volume significantly. The breath sounds are automatically diminished on the appropriate side due to decreased ventilation of the affected lung.

Default: 0

Range: 0 mL - 2500 mL

Fraction of Inspired O_2 (FiO_2)

This parameter is used to simulate changes in the **FiO_2**, such as would occur with the administration of supplemental oxygen. Use this parameter to simulate supplemental oxygen.

Default: 21%

Range: 0% - 100%

Respiratory – Additional Parameters

Respiratory Parameters – Additional
Respiratory Rate
Tidal Volume
Tidal Volume Factor
pH Shift
PEEP
O_2 Consumption
CO_2 Production Factor
$PaCO_2$ Set-point
I to E Ratio (1:X)
$PetCO_2$-$PaCO_2$ Factor
Respiratory Gain Factor
Respiratory Quotient
Volume/Rate Control Factor
Chest Wall Capacity
Chest Wall Compliance Factor
Distended Chest Wall Compliance Factor
Functional Residual Capacity
Lung Compliance Factor: Left Lung Compliance Factor: Right
Venous CO_2 Shift
Bronchial Resistance Factor Left Bronchial Resistance Factor Right
Alveolar Enflurane
Alveolar Halothane
Alveolar Isoflurane
Alveolar Sevoflurane

Respiratory Rate

The **Respiratory Rate** parameter is used to set the respiratory rate to a given number of breaths per minute. Once set, arterial oxygen and carbon dioxide values have no effect on the resulting respiratory rate, but continue to influence other components of the physiological models. The patient continues to breathe at the set number of breaths-per-minute, regardless of the arterial oxygen or carbon dioxide levels.

For example, when the respiratory rate is set to 10 breaths per minute, the respiratory rate remains at 10 breaths per minute, regardless of arterial oxygen or carbon dioxide levels. In such situations, the patient can only respond to arterial oxygen or carbon dioxide levels by adjusting the **Tidal Volume** parameter.

Default: Modeled

Range: 4 breaths per minute - 40 breaths per minute

Tidal Volume

The **Tidal Volume** parameter is used to set the tidal volume to a given volume per breath. Once tidal volume is set to a numeric value, arterial oxygen and carbon dioxide values have no effect on the tidal volume, but continue to influence other components of the physiological models.

For example, with the tidal volume set to 600 mL in the adult simulator, the tidal volume remains a constant (set) 600 mL even in the event of falling arterial oxygen levels. In such situations, the patient can only respond to arterial oxygen or carbon dioxide levels when the respiratory rate is adjusted

Default: Modeled

Range: 0 mL- 2500 mL

Tidal Volume Factor

The **Tidal Volume Factor** (along with the **Respiratory Rate Factor**) parameter is used to change the baseline tidal volume (before the control-of-breathing and drug influences are taken into account.) A value of 2 doubles the baseline tidal volume. A value of 0.5 decreases the baseline tidal volume by 50%.

Default: 1

Range: 0.10 - 4.00

TIP: First decrease the respiratory gain factor to reduce the influence of the respiratory control mechanism on the respiratory rate and tidal volume.

pH Shift

The **pH Shift** parameter is used to create a metabolic acidosis or metabolic alkalosis under script control.

The default pH value displayed on the Patient Status Display or TouchPro software is dependent on respiratory arterial CO_2 values. Under default conditions ($PaCO_2$ = 40 mmHg), the pH is approximately 7.4. Rising arterial CO_2 produces a subsequent drop in pH, while falling arterial CO_2 levels result in rising pH values.

To simulate pH changes with metabolic changes (acidosis or alkalosis), the **pH Shift** value is a mathematical addition to (or subtraction) from the displayed pH value to that which is desired.

Default: 0

Range: -(0.50) - 0.50

Positive End Expiratory Pressure (PEEP)

The **PEEP** parameter specifies the amount of positive end expiratory pressure applied during mechanical ventilation. Setting this parameter results in clinically appropriate intrathoracic pressures and hemodynamic responses. **PEEP** must be set both in the software and on the ventilator.

Default: 0 cmH_2O

Range: 0.0 cmH_2O - 25.0 cmH_2O

O_2 Consumption

The **O_2 Consumption** parameter is used to change the rate of consumption of oxygen and production of carbon dioxide.When **O_2 Consumption** is increased and used with increased **Shunt Fraction**, profound levels of hypoxia can be achieved.

Default: 250 mL per minute

Range: 0 mL per minute - 2000 mL per minute

CO_2 Production Factor

The **CO_2 Production Factor** parameter allows for the manipulation of metabolic CO_2 production to simulate a variety of pathophysiological conditions. CO_2 production is determined by the **O_2 Consumption** and **Respiratory Quotient** settings. A CO_2 Production Factor value of 2 doubles the CO_2 production, while a value of 0.5 decreases the CO_2 production by 50%.

Default: 1

Range: 0.50 - 4.00

$PaCO_2$ Set-point

The **$PaCO_2$ Set-point** parameter is a set point for $PaCO_2$. The control-of-breathing model adjusts tidal volume and respiratory rate in order to bring the $PaCO_2$ toward this set point. Factors that influence the success of this control effort include baseline tidal volume, baseline respiratory rate, respiratory gain, O_2 consumption, respiratory quotient, lung compliances, chest wall compliance, bronchial resistances, the presence of artificial airways in the simulator and the inspired gas mixture.

When the $PaCO_2$ Set-Point is set to a new value, the physiological controls adjust the simulator's respiratory pattern in an attempt to attain the desired set point. For example, when the set point is raised from 40 to 50 mmHg, there is a transitory decrease in respiratory rate and tidal volume, as the physiological controls attempt to drive the $PaCO_2$ toward 50 mmHg. When the $PaCO_2$ reaches the new set point, the simulator's respiratory rate and tidal volume should return to normal values.

Default: 40 mmHg

Range: 20.0 mmHg - 70.0 mmHg

PaO_2 Set-point

The **PaO_2 Set-point** parameter is a set point for PaO_2. When PaO_2 is below the set point value, progressive stimulation of spontaneous minute ventilation occurs. Both tidal volume and respiratory rate rise, which under appropriate conditions results in PaO_2 moving closer to the set point. Factors that influence this control effort include baseline tidal volume, baseline respiratory rate, respiratory gain, O_2 consumption, respiratory quotient, lung compliances, chest wall compliance, bronchial resistances, the presence of artificial airways in the simulator and the inspired gas mixture. Minute ventilation is not affected for PaO_2 above the set point.

For example, if **PaO_2 Set-point** is set to 100 mmHg and PaO_2 drops to 90 mmHg, ventilatory stimulation occurs. When the PaO_2 reaches the new set point, the simulator's respiratory rate and tidal volume are again controlled to maintain $PaCO_2$ at the $PaCO_2$ set point (*see **$PaCO_2$ Set-point***).

Default: 100.00 mmHg

Range: 20.0 mmHg - 100.0 mmHg

I to E Ratio (1:X)

The **I to E Ratio (1:X)** parameter sets the inspiratory-expiratory (I:E) ratio for spontaneous ventilation. At the default setting, the time for exhalation is twice that of inhalation.

Default: 2

Range: 0.0 - 7.0

$PetCO_2$- $PaCO_2$ Factor

The **$PetCO_2$-$PaCO_2$ Factor** adjusts the end-tidal CO_2 relative to the $PaCO_2$. At the default value of 1, $PetCO_2$ very closely approximates $PaCO_2$. When **$PetCO_2$- $PaCO_2$ Factor** is set at a value of 2, $PetCO_2$ is approximately one half of $PaCO_2$. $PetCO_2$ depends on CO_2 production and alveolar ventilation. Because the alveolar dead space is not modeled physically in the hardware, the responses to changes in mechanical ventilation settings may not be exact. The use of the Onset feature (e.g., onset over 1 minute) is recommended for this parameter.

Default: 1

Range: 0.9 -10.0

Respiratory Gain Factor

The **Respiratory Gain Factor** determines how strong an influence arterial CO_2 levels have on the simulated patient's tidal volume and respiratory rate. Under default conditions (value = 1), when arterial CO_2 levels rise, the patient's respiratory rate and tidal volume show a transitory increase in an attempt to return the patient to the physiological control CO_2 set-point. If the **Respiratory Gain Factor** is increased to more than 1, the patient has a more pronounced response, while values less than 1 correspond to a blunted response.

Default: 1

Range: 0.00 - 10.00

Respiratory Quotient

Respiratory Quotient is the rate of carbon dioxide production divided by the rate of oxygen consumption. Changes to the **Respiratory Quotient** parameter alter the rate of carbon dioxide production relative to the rate of oxygen consumption.

Default: 0.8

Range: 0.50 - 1.10

Volume/Rate Control Factor

Ventilatory responses to increased arterial carbon dioxide or decreased arterial oxygen may take the form of increased tidal volume, increased respiratory rate, or both. The volume/rate control factor determines these relative changes. At a value of 1, increased and decreased ventilatory drive affect tidal volume and respiratory rate equally. When volume/rate control is greater than 1, increased or decreased minute ventilation is predominantly achieved by changes in tidal volume. When the volume/rate control factor is less than 1, ventilatory changes are affected primarily by changes in respiratory rate.

For example, set the volume/rate control factor to 0.1 and increase the shunt fraction to 0.4 to decrease the arterial O_2. The patient responds to falling arterial oxygen levels with increased minute ventilation. Increasing the respiratory rate with minimal increase in tidal volume produces this.

Default: 1 mL

Range: 0.1 mL - 10.0 mL

Chest Wall Capacity

The **Chest Wall Capacity** parameter sets the total (combined) intrapleural and lung volumes at which the chest wall is considered distended. Also, see **Chest Wall Compliance Factor** and **Distended Chest Wall Compliance Factor**.

Default: 3900

Range: 1500 - 3900

Chest Wall Compliance Factor

This **Chest Wall Compliance Factor** parameter describes the interaction of the chest wall with the lungs. The **Chest Wall Compliance Factor** parameter defines the volume-pressure relationship in the normal operating lung volumes. Once distended, however, the chest wall rapidly becomes much less compliant (i.e., much "stiffer") and resistant to further inflation.

Default: 1

Range: 0.15 - 10.00

Distended Chest Wall Compliance Factor

The **Distended Chest Wall Compliance Factor** parameter, along with the **Chest Wall Compliance Factor** parameter, describes the interaction of the chest wall with the lungs. The **Chest Wall Compliance Factor** parameter defines the volume-pressure relationship in normal lung volumes. Once distended, however, the chest wall rapidly becomes much "stiffer" and resistant to further inflation. Also, see **Chest Wall Compliance Factor**.

The **Distended Chest Wall Compliance Factor** parameter must be set to a low value for increased intrapleural volumes to result in elevated inspiratory pressures with positive pressure ventilation. Also, see **Intrapleural Volume (Vol): Left** or **Intrapleural Volume (Vol): Right** parameters.

Default: 1

Range: 0.10 - 10.00

Functional Residual Capacity

The **Functional Residual Capacity** parameter sets the combined left and right lung volume remaining at the end of a normal, spontaneous exhalation.

Default: 2300 mL

Range: 500 mL- 4000 mL

Lung Compliance Factor: (Left and Right)

These two parameters independently set the left and right lung compliance. Lung compliance factor determines how easily the lungs inflate. Low compliance factors (less than 1) create "stiff" lungs requiring more pressure for expansion. High compliance factors (greater than 1) create "loose" lungs that easily inflate with less pressure.

Default: 1

Range: 0.15 - 10.00

Venous CO_2 Shift

The **Venous CO_2 Shift** parameter affects the partial pressure of CO_2 in the venous blood. Changing this parameter allows large and rapid shifts in total body CO_2 concentration. Increases in alveolar and arterial CO_2 follow rapidly in a physiologically correct magnitude and time course.

This parameter is useful for giving a "bolus" of CO_2 to the venous system. The alveolar and arterial CO_2 levels rise rapidly in response to the added carbon dioxide but soon returns to "pre-bolus" levels as increased ventilation efforts work to eliminate the added CO_2. Therefore, the rise in CO_2 levels is only transitory.

Default: 0 mmHg

Range: 0.0 mmHg - 60.0 mmHg

Bronchial Resistance Factor (Left and Right)

When using the **Bronchial Occlusion** parameter, the rate of resistance can be set using the **Left or Right Bronchial Resistance Factor** parameters. The rate of resistance can also be set to occur over time.

Default: 1 cmH_2O

Range: 0.3 cmH_2O - 1000.0 cmH_2O

Alveolar Enflurane

The **Alveolar Enflurane** parameter is used to simulate the presence of enflurane in the alveolar space without using real anesthetic vapors. The enflurane percentage is input to the drug models to achieve the expected pharmacodynamic effects (e.g., respiratory depression.)

Default: 0%

Range: 0.00% - 5.00%

Alveolar Halothane

The **Alveolar Halothane** parameter is used to simulate the presence of halothane in the alveolar space without using real anesthetic vapors. The halothane percentage is input to the drug models to achieve the expected pharmacodynamic effects (e.g., respiratory depression.)

Default: 0%

Range: 0.00% - 5.00%

Alveolar Isoflurane

The **Alveolar Isoflurane** parameter is used to simulate the presence of isoflurane in the alveolar space without using real anesthetic vapors. The isoflurane percentage is input to the drug models to achieve the expected pharmacodynamic effects (e.g., respiratory depression.)

Default: 0%

Range: 0.00% - 5.00%

Alveolar Sevoflurane

The **Alveolar Sevoflurane** parameter is used to simulate the presence of sevoflurane in the alveolar space without using real anesthetic vapors. The sevoflurane percentage is input to the drug models to achieve the expected pharmacodynamic effects (e.g., respiratory depression.)

Default: 0%

Range: 0.00% - 8.00%

Cardiovascular – Basic Parameters

Cardiovascular Parameters – Basic
Blood Pressure
Heart Rate
Heart Rate Factor
Cardiac Rhythm
Arterial Catheter
Central Venous Catheter
PA Catheter
PA Balloon
Defib
Pacing Current
Pacing Rate
Pacing Capture Threshold
Cold Fluid Inject

Blood Pressure

The **Blood Pressure** parameter is used to override the physiological modeling for blood pressure. The systolic and diastolic blood pressures can both be set to fixed numeric values, regardless of interventions performed. Resetting the parameter to **Modeled** returns control of the underlying Blood Pressure to the physiological models.

Default: Modeled

Range: Systolic 20 mmHg - 200 mmHg

Diastolic 10 mmHg - 200 mmHg

Heart Rate

The **Heart Rate** parameter is used to set the heart rate to a given (fixed) number of beats per minute. Once the heart rate is set to a numeric value, administered drugs or intravascular volume changes have no effect on the heart rate, but continue to influence other components of the physiological models. Use this parameter to "fix" or set the heart rate to a specific number.

Default: Modeled

Range: 30 beats per minute - 275 beats per minute

Heart Rate Factor

The **Heart Rate Factor** parameter is used to change the baseline heart rate before physiological controls are taken into account. A value of 2 doubles the baseline heart rate, while a value of 0.5 decreases the heart rate by 50%. Use this parameter to raise or lower the heart rate.

Default: 1

Range: 0.10 - 4.00

Cardiac Rhythm

The **Cardiac Rhythm** parameter is used to change the patient's underlying cardiac rhythm displayed on the Patient Status Display, TouchPro software or physiological monitor. To change the cardiac rhythm, click the **Cardiac Rhythm** parameter and select the desired rhythm from the available list. If a number appears following the cardiac rhythm on the list, this overrides the heart rate to the rate indicated. For cardiac rhythms without a number, the **Heart Rate Factor** parameter can be used to independently control the heart rate.

Default: Sinus

Options: Asystole
Atrial Fibrillation
Atrial Fibrillation: HR 80
Atrial Fibrillation: HR 120
Atrial Flutter
Atrial Flutter: HR 150
Bundle Branch Block: Left
Bundle Branch Block: Left with PVCs
Bundle Branch Block: Right
Mobitz Type I: Wenckebach
Mobitz Type II
Myocardial Ischemia: Mild
Myocardial Ischemia: Moderate
Myocardial Ischemia: Moderate with PVCs
Myocardial Ischemia: Severe
Normal Junctional
Normal Junctional: HR 50
Paroxysmal Junctional Tachycardia
Paroxysmal Junctional Tachycardia: HR 130
PEA: Pulseless Electrical Activity
Sinus
Sinus Tachycardia
Sinus Tachycardia: HR 120
Sinus Bradycardia
Sinus Bradycardia: HR 40
Sinus with PAC
Sinus with PVCs: 10%
Sinus with PVCs: 25%
ST Elevation with Chest Pain
Third Degree AV Block
Ventricular Fibrillation: Coarse
Ventricular Fibrillation: Fine
Ventricular Tachycardia
Ventricular Tachycardia: HR 151
Ventricular Tachycardia: Pulseless
Ventricular Tachycardia: Pulseless HR 151

Arterial Catheter

The arterial pressure displayed on the Patient Status Display or TouchPro software is set using this parameter. A non-pulsatile, "zero" pressure signal is emitted when the **Atmosphere** position is selected and can be used to simulate zeroing a pressure transducer. This may also be used to remove the arterial pressure waveform, if desired. The **Left Ventricle** position is useful for simulating cardiac catheterization procedures, or for demonstrating left ventricular end-diastolic pressure and its relationship to pulmonary artery occlusion ("wedge") and central venous pressure.

Default: Peripheral Artery

Options: Atmosphere
Peripheral Artery
Left Ventricle

Central Venous Catheter

The venous pressure displayed on the Patient Status Display or TouchPro software is set using this parameter. A non-pulsatile, "zero" pressure signal is emitted when the **Atmosphere** position is selected and can be used to simulate zeroing a pressure transducer. This may also be used to remove the central venous pressure waveform, if desired (i.e., beginning of an SCE with an "unmonitored" patient).

Default: Intrathoracic Vein

Options: Atmosphere
Extrathoracic Vein
Intrathoracic Vein

Pulmonary Artery (PA) Catheter

The pulmonary artery pressure displayed on the Patient Status Display or TouchPro software is set using this parameter. A non-pulsatile, "zero" pressure signal is emitted when the **Atmosphere** position is selected and can be used to simulate zeroing a pressure transducer. This may also be used to remove the pulmonary artery pressure waveform, if desired (i.e., beginning of an SCE with an "unmonitored" patient). The pulmonary artery catheter can be "floated" into position by sequencing through the right heart positions. This may also be scripted into a scenario using the Scenario Designer.

Default: Pulmonary Artery

Options: Atmosphere
Intrathoracic Vein
Right Atrium
Right Ventricle
Pulmonary Artery

PA Balloon

Inflation of the pulmonary artery catheter balloon is simulated by switching to the **Inflated** option of the **PA Balloon** parameter. The appropriate pulmonary artery occlusion or "wedge" waveform is then displayed on the Patient Status Display or TouchPro software.

Default: Deflated

Options: Deflated
Inflated

Defibrillation (Defib)

The **Defib** parameter is used to simulate a specified amount of energy discharged via an external cardiac defibrillator. Setting this parameter results in the characteristic spike in the ECG, followed by a return to the pre-defibrillation rhythm. **Defib** has no direct effect on the electrical conduction system of the heart. Thus, synchronized cardioversion may be done "on the fly" or scripted using the Scenario Designer.

Default: 0 Joules

Range: 0 Joules- 360 Joules

Pacing Current

The **Pacing Current** parameter is used to simulate a specified amount of current discharged via an external cardiac pacer. Setting this parameter results in the characteristic pacing signal on the ECG waveform when the pacing current is at or above the capture threshold. Also, see **Pacing Capture Threshold**.

Default: 0 mA

Range: 0 mA- 200 mA

Pacing Rate

The **Pacing Rate** parameter determines the cardiac rate (in beats/minute) when the pacing current is at or above the pacing capture threshold. Also, see **Pacing Current** and **Pacing Capture Threshold**.

Default: 80 beats per minute

Range: 0 beats per minute - 119 beats per minute

Pacing Capture Threshold

The **Pacing Capture Threshold** parameter determines the minimum pacing current necessary to pace the heart via an external cardiac pacer. Also see **Pacing Current**. Pacing current values below the pacing capture threshold have no effect on the patient's heart rate.

Default: 50 mA

Range: 0 mA - 119 mA

Cold Fluid Inject

The **Cold Fluid Inject** parameter is used to simulate the injection of 10 mL iced saline into the pulmonary artery catheter. The appropriate Thermodilution waveform and cardiac output measurement are then displayed on the Patient Status Display or TouchPro software.

Cardiovascular – Additional Parameters

Cardiovascular Parameters – Additional
Baroreceptor Maximum Pressure
Baroreceptor Minimum Pressure
Left Ventricle Contractillity Factor
Right Ventricle Contractility Factor
Systemic Vascular Resistance Factor
Venous Capacity Factor
Systemic Arteries Compliance Factor
Pulmonary Arteries Compliance Factor
Pulmonary Vasculature Resistance Factor
Venous Return Resistance Factor
Baroreceptor Gain (Overall) Factor
Baroreceptor Gain (Cardiac) Factor
Baroreceptor Gain (Peripheral) Factor
Chest Compression Efficacy
Tamponade Volume
Aortic Valve Resistance Factor
Mitral Valve Resistance Factor
Pulmonic Valve Resistance Factor

Baroreceptor Maximum Pressure

Baroreceptor maximum pressure defines the mean arterial pressure (MAP) at which the baroreceptor inhibitory activity on the heart is maximal. When a simulated patient's MAP increases above baseline pressure, the baroreceptor response exerts greater inhibitory controls on the MAP (e.g., reduction in heart rate) in an attempt to return the MAP to the patient's baseline pressure. However, these controls have an upper limit, and this "maximum pressure" is defined as the baroreceptor maximum pressure.

In other words, as the MAP increases, the physiological controls (i.e., baroreceptor response) work to bring the pressure back toward baseline, primarily by reducing the heart rate. For every 5 mmHg increase in MAP, the heart rate may decrease by 2 beats per minute in an attempt to keep the MAP in check. However, there is an upper limit ("maximum pressure"), after which these controls are no longer effective. Once the MAP reaches the baroreceptor maximum pressure, there is no additional reduction in heart rate if the pressure continues to rise. For example, should the pressure continue to rise, the heart rate would not show a corresponding slowing.

Default: 112 mmHg

Range: 40 mmHg - 220 mmHg

NOTE: It is important to set both the baroreceptor maximum pressure and the baroreceptor minimum pressure at the same time for the software to recognize the baroreceptor reset.

Baroreceptor Minimum Pressure

Baroreceptor minimum pressure defines the mean arterial pressure (MAP) at which the baroreceptor inhibitory activity on the heart is minimal. When a simulated patient's MAP decreases below baseline pressure, the baroreceptor response exerts inhibitory controls on the MAP (e.g., increase in heart rate) in an attempt to return the MAP to the patient's baseline pressure. However, these controls have a lower limit, and this "minimum pressure" is defined as the baroreceptor minimum pressure.

In other words, as the MAP decreases, the physiological controls (i.e., baroreceptor response) work to bring the pressure back toward baseline, primarily by increasing the heart rate. For every 5 mmHg decrease in MAP, the heart rate may increase by 2 beats per minute in an attempt to keep the MAP in check. However, there is a lower limit ("minimum pressure"), after which these controls are no longer effective. Once the MAP reaches the baroreceptor minimum pressure, there is no additional increase in heart rate if the pressure continues to fall. For example, should the pressure continue to fall, the heart rate would not show a corresponding increase.

Default: 72 mmHg

Range: 20 mmHg - 160 mmHg

NOTE: It is important to set both the baroreceptor maximum pressure and the baroreceptor minimum pressure at the same time for the software to recognize the baroreceptor reset.

Left Ventricle Contractility Factor

The **Left Ventricle Contractillity Factor** parameter adjusts the contractility of the left ventricle and has a direct effect on cardiac output and blood pressure. Use this parameter to raise or lower the cardiac output.

Default: 1

Range: 0.10 - 5.00

Right Ventricle Contractility Factor

The **Right Ventricle Contractility Factor** parameter adjusts the contractility of the right ventricle and has a direct effect on pulmonary artery pressure and an inverse effect on central venous pressure. Use this parameter to raise or lower pulmonary artery pressure (PAP) or to change the central venous pressure (CVP).

Default: 1

Range: 0.10 - 5.00

Systemic Vascular Resistance Factor

The **Systemic Vascular Resistance Factor** parameter adjusts the baseline systemic vascular resistance. Raising the value increases the systemic vascular resistance while lowering the value decreases the vascular resistance.

Raising the parameter value is analogous to increasing the resistance to blood flow through the systemic vasculature. Under such conditions, the arterial blood pressure (ABP) increases, and the heart rate may decrease due to feedback from the physiological control mechanisms.

Default: 1

Range: 0.10 - 10.00

Venous Capacity Factor

The **Venous Capacity Factor** parameter adjusts the volume of blood contained in the unstretched venous system without an increase in venous pressure. Raising the value decreases the venous capacitance (vasodilatation and decreased vascular tone), while lowering the value increases the venous capacitance (vasoconstriction and increased vascular tone).

The volume of blood in the venous system has an inverse relationship to the blood pressure. Lowering the value is analogous to a "shift" in blood from the venous system to the arterial system, and this shift, when coordinated with increased systemic vascular resistance, results in an increase in blood pressure [arterial blood pressure (ABP), pulmonary artery pressure (PAP) and central venous pressure (CVP)].

Default: 1

Range: 0.10 - 100.00

Systemic Arteries Compliance Factor

The **Systemic Arteries Compliance Factor** parameter adjusts the pulse pressure (difference between systolic and diastolic pressures) of the simulated patient's systemic blood pressure. Increases in the compliance factor result in a decreased (narrower) pulse pressure, while smaller values increase the pulse pressure. Additionally, when the pulse pressure increases as a result of a reduced compliance factor, both systolic and diastolic pressures increase. Conversely, with a narrower pulse pressure (higher compliance factor), both the systolic and diastolic blood pressures also drop.

Default: 1

Range: 0.50 - 5.00

Pulmonary Arteries Compliance Factor

The **Pulmonary Arteries Compliance Factor** parameter adjusts the pulse pressure (difference between systolic and diastolic pressures) of the simulated patient's pulmonary blood pressure. Increases in the compliance factor decrease (narrow) the pulse pressure, while smaller values increase the pulse pressure. Additionally, when the pulse pressure increases as a result of a reduced compliance factor, both systolic and diastolic pulmonary pressures increase. Conversely, with a narrower pulse pressure (higher compliance factor) both the systolic and diastolic pulmonary pressures also drop.

Default: 1

Range: 0.20 - 5.00

Pulmonary Vasculature Resistance Factor

The **Pulmonary Vasculature Resistance Factor** parameter adjusts the baseline pulmonary vascular resistance. Raising the value increases the pulmonary vascular resistance, while lowering the value decreases the vascular resistance.

Raising the parameter value is analogous to increasing the resistance to blood flow through the pulmonary vasculature. Under such conditions, the pulmonary artery pressure (PAP) and central venous pressure (CVP) increase due to back-pressure through the right side of the heart.

Default: 1

Range: 0.10 - 10.00

Venous Return Resistance Factor

The **Venous Return Resistance Factor** parameteradjusts the resistance between the extrathoracic and intrathoracic venous compartments. Raising the value increases the resistance, while lowering the value decreases the resistance.

With less blood returning to the heart, there is a reduced volume entering the ventricles prior to ventricular contraction. This results in a drop in the cardiac output and decrease in arterial blood pressures. The heart rate increases due to feedback from the physiological control mechanisms in an attempt to maintain adequate blood pressures.

Default: 1

Range: 0.10 - 100.00

Baroreceptor Gain (Overall) Factor

The **Baroreceptor Gain (Overall) Factor** parameteradjusts the influence of mean arterial pressure (MAP) on heart rate, contractility, systemic vascular resistance and venous capacity. Use this parameter to adjust how vigorously the heart and vasculature respond to blood pressure changes. The degree of increase in heart rate or vascular response is influenced by the baroreceptor gain (overall) factor.

For example, when blood pressure falls, the heart rate increases, the arteries increase their vascular tone (resistance) and there is less pooling of the blood in the venous system, all in an attempt to maintain adequate blood pressure. A barorecptor gain (overall) factor value of less than 1 corresponds to baroreceptor depression. A barorecptor gain (overall) factor value greater than 1 leads to a stronger response to MAP changes.

Default: 1

Range: 0.00 - 100.00

Baroreceptor Gain (Cardiac) Factor

The **Baroreceptor Gain (Cardiac) Factor** parameter selectively adjusts the influence of mean arterial pressure (MAP) on the heart rate and contractility influencing how much the heart rate increases or decreases with changes in blood pressure. Use this parameter to adjust how vigorously the heart responds to blood pressure changes.

A baroreceptor gain (cardiac) factor of less than 1 corresponds to baroreflex depression (e.g., less heart rate response to MAP changes). A value greater than 1 leads to a stronger response to MAP changes.

Default: 1

Range: 0.00 - 10.00

Baroreceptor Gain (Peripheral) Factor

The **Baroreceptor Gain (Peripheral) Factor** parameter adjusts the influence of mean arterial pressure (MAP) on systemic vascular resistance and venous capacity influencing how much the vasculature responds to changes in blood pressure.

For example, when blood pressure falls, the arteries increase their vascular tone (resistance), and there is less pooling of the blood in the venous system, in an attempt to maintain adequate blood pressure. A factor of less than 1 corresponds to baroreflex depression (e.g., less systemic vascular resistance response to MAP changes). A value greater than 1 leads to a stronger response to MAP changes.

Default: 1

Range: 1.00 - 10.00

Chest Compression Efficacy

The **Chest Compression Efficacy** parameter is used to determine the effectiveness of the chest compression administered by the caregiver. The 100% setting indicates that chest compressions are completely effective, while the 0% setting prevents them from having any effect on intrathoracic pressure.

Default: 100%

Options: 100%
0%

Tamponade Volume

The **Tamponade Volume** parameter is used to set the amount of fluid or blood that is building up in the space between the myocardium and the pericardium, causing a cardiac tamponade.

Default: 0 mL

Range: 0 mL - 500 mL

Aortic Valve Resistance Factor

The **Aortic Valve Resistance Factor** parameter is used to adjust the resistance to blood flow across the aortic valve. Increasing the value to greater than 1 corresponds to increased resistance to blood flow through the aortic valve.

Default: 1

Range: 1 - 1000

Mitral Valve Resistance Factor

The **Mitral Valve Resistance Factor** parameter is used to adjust the resistance to blood flow across the mitral valve. Increasing the value to greater than 1 corresponds to increased resistance to blood flow through the mitral valve.

Default: 1

Range: 1 - 1000

Pulmonic Valve Resistance Factor

The **Pulmonic Valve Resistance Factor** parameter is used to adjust the resistance to blood flow across the pulmonic valve. Increasing the value to greater than 1 corresponds to increased resistance to blood flow through the pulmonic valve.

Default: 1

Range: 1 - 1000

Pulses

The table below shows the defaults and ranges for the pulses and pulse deficits for the PediaSIM ECS.

Pulse	Default	Range
Left Carotid	On	N/A
Right Carotid	On	N/A
Carotid Deficit	60	0 - 300
Left Brachial	On	N/A
Right Brachial	On	N/A
Brachial Deficit	80	0 - 300
Left Radial	On	N/A
Right Radial	On	N/A
Radial Deficit	90	0 - 300
Left Femoral	On	N/A
Right Femoral	On	N/A
Femoral Deficit	70	0 - 300
Left Popliteal	On	N/A
Right Popliteal	On	N/A
Popliteal Deficit	80	0 - 300

All pulses, unless altered by an SCE, are enabled by default. To disable a pulse, click the pulse location on the human form. To enable a pulse, click the pulse location again. Click and hold a pulse location to adjust the pulse deficit.

Fluids

The blood droplet provides a means of controlling the amount of fluid lost by or infused into the patient. The amount of fluid to be lost or infused and the time frame during which the fluid loss or infusion takes place can be entered.

Fluid Parameters
Fluid Loss Blood
Fluid Loss Plasma
Colloid Infusion
Crystalloid Infusion
PRBC Infusion
Whole Blood Infusion

Fluid Loss Blood

When used, the **Fluid Loss Blood** parameter reflects a decrease in total blood volume. Blood loss proportionally decreases both the red blood cell volume and the plasma volume according to the current hematocrit.

Range: 0 mL - 4000 mL

Fluid Loss Plasma

When used, the **Fluid Loss Plasma** parameter reflects a decrease in plasma volume. Plasma loss decreases the plasma volume without changing the red blood cell volume. It refers collectively and generically to all fluid losses, including evaporative, transcellular, bowel and third space fluid losses.

Range: 0 mL - 4000 mL

Colloid Infusion

When used, the **Colloid Infusion** parameter reflects an addition to the plasma volume without changing the red blood cell volume. Colloids include modified fluid gelatin starch solutions, dextran and human albumin.

Range: 0 mL - 4000 mL

Crystalloid Infusion

When used, the **Crystalloid Infusion** parameter reflects an addition to the plasma volume without changing the red blood cell volume. The term crystalloid is used to describe salt solutions for infusion (i.e., normal saline, dextrose in water and Ringer's Lactate).

Range: 0 mL - 4000 mL

Packed Red Blood Cells (PRBC) Infusion

PRBCs are a preparation of 70% red blood cells and 30% liquid plasma, often administered in severe anemia to restore adequate levels of hemoglobin and red cells without overloading the vascular system with excess fluids.

Range: 0 mL - 4000 mL

Whole Blood Infusion

The term whole blood is used to refer to blood that has not been separated into its various components. It represents a preparation of 40% red blood cells and 60% liquid plasma.

Range: 0 mL - 4000 mL

Sounds

A variety of sounds are available to enhance realism.

Wireless Microphone

A wireless microphone is available to provide phonation or a voice from the patient. To use the wireless microphone, attach the transmitter to a belt or pocket and snap the microphone to a lapel or shirt pocket.

Wireless Microphone

Verify that the two antennas located on the front of the wireless receiver on the PCU are extended and that the transmitter has been set to the same channel as the receiver on the PCU (the default setting).

Switch the receiver and the microphone to the **ON** position.

Adjust the volume using either the volume setting on the receiver (on the PCU) or with the **Microphone Volume** on the software. To access the **Microphone Volume**, click the **Sounds** button from the Run screen, and click **Microphone Volume** from the Sounds panel. Adjust the slider to the desired volume.

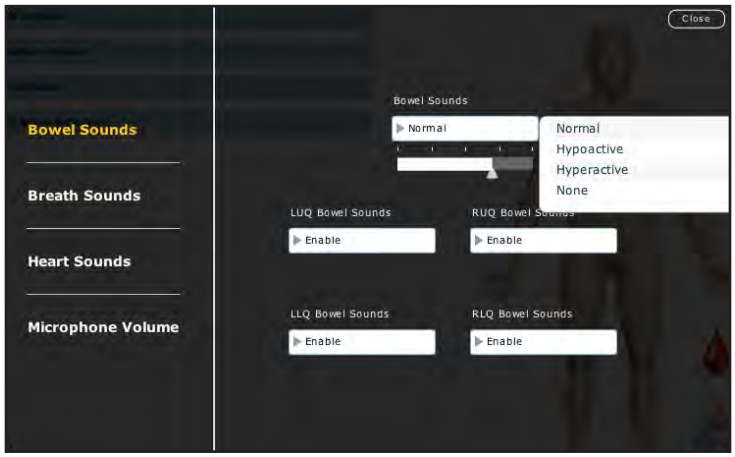
The Microphone Volume Control

The receiver and transmitter are factory-configured to the same channel. However, if they need to be reset (e.g., when multiple simulators are in use), adjust the frequencies using the Group and Channel settings on the microphone and receiver with a small screwdriver. These settings must be identical. Detailed instructions are shipped with the microphone.

The wireless microphone transmits over user-selectable frequencies of between 790 and 806 MHz at 10 mW, a range legally appropriate for the United States and most international sites.

Bowel Sounds

Learners can auscultate bowel sounds over each of four intestinal quadrants: the Upper Right, Upper Left, Lower Right and Lower Left. The sounds can be independently set in each anatomical region to **Normal**, **Hypoactive**, **Hyperactive** or **None** (bowel sounds are absent).



The Bowel Sounds Menu

Bowel sounds can be adjusted by clicking the **Sounds** button on the Run screen. When the Sounds panel appears, select **Bowel Sounds**.

Click any one of the **Bowel Sounds** drop-down menus that controls one of four quadrants to change the type of sound.

Click and drag the slider for each location to adjust the volume.

Normal bowel sounds are present by default.

NOTE: A patient must be running on the PediaSIM ECS simulator for any sounds to be available.

Breath Sounds

Breath sounds are independently synchronized with ventilation of the left and right lungs. Speakers in the anterior and posterior regions provide breath sounds that can be auscultated.

Breath sounds can be adjusted by clicking the **Sounds** button on the Run screen. When the Sounds panel appears, select **Breath Sounds**.

Breath Sounds
Normal
Crackles
Diminished
Wheezing

Click any one of the **Breath Sounds** in the drop-down menu to select a Breath Sound. Click and drag the slider for each location to adjust the volume.

NOTE: A patient must be running on the PediaSIM ECS simulator for any sounds to be available.

By default, **Normal** breath sounds are heard.

The Breath Sounds Menu

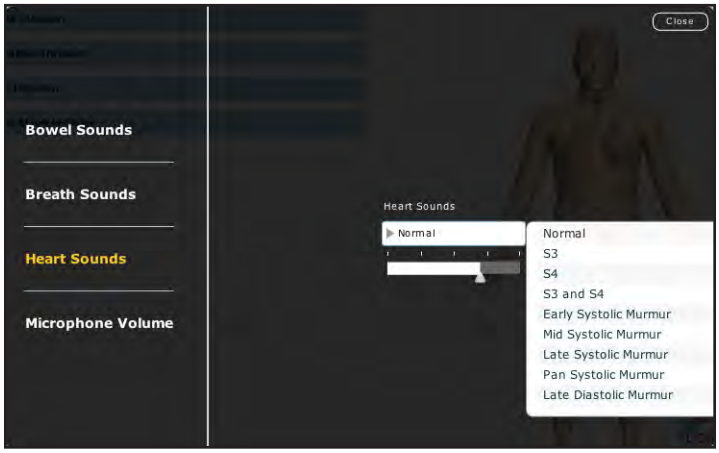
Heart Sounds

Heart sounds emanate from speakers and are synchronized with the cardiac cycle. Heart sounds can be auscultated over the left and right sternal border, right lower sternal border and apex.

By default, heart sounds are set to **Normal**. The following sounds are available:

Heart Sounds
Normal
S3
S4
S3 and S4
Early Systolic Murmur
Mid Systolic Murmur
Late Systolic Murmur
Pan Systolic Murmur
Late Diastolic Murmur

Heart sounds can be adjusted by clicking the **Sounds** button on the Run screen. When the Sounds panel appears, select **Heart Sounds**.



The Heart Sounds Menu

Click the **Heart Sounds** drop-down menu to change the type of sound. Click and drag the slider to adjust the volume.

NOTE: A patient must be running on the PediaSIM ECS simulator for any sounds to be available.

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